a journal for precision engineers and all users of industrial diamonds and other hard materials

INDUSTRIAL DIAMOND REVIEW

1/19

MECHANICAL ENGINEERING RESEARCH LABORATORY
2 MAR 1959
LIBRARY

incorporating INDUSTRIAL DIAMOND ABSTRACTS

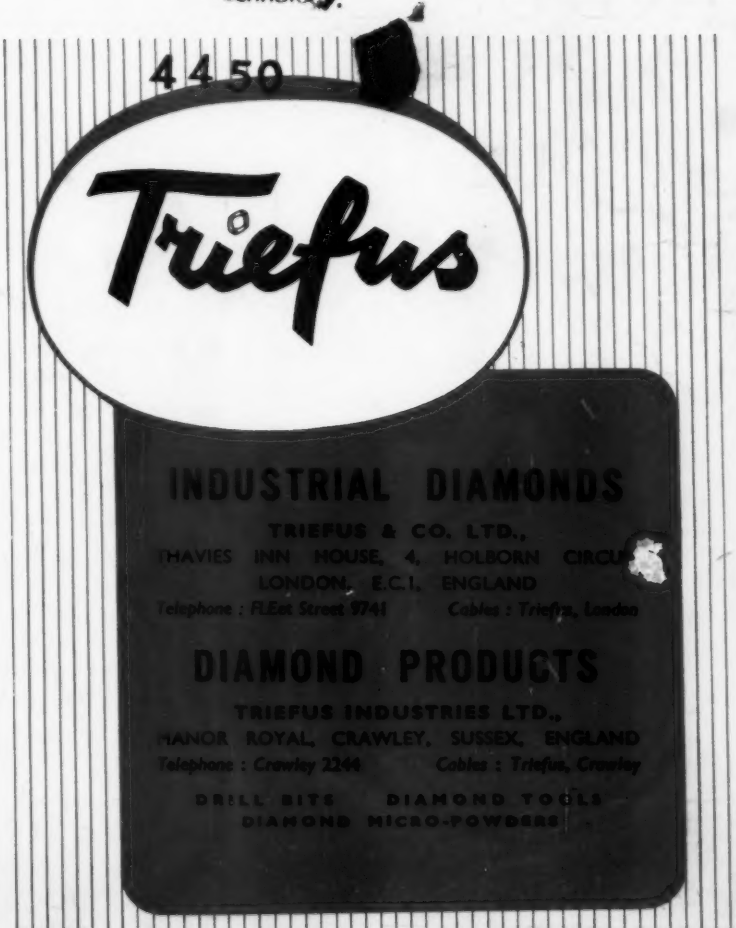
MONTHLY 1/3 SUBSCRIPTION 15/- A YEAR

February, 1959 Vol. 19 No. 219

D. S. I. R.
National Lending Library for Science and Technology.

4450

AUSTRALIA
BENELUX
BRAZIL
BRITISH GUIANA
CANADA
FRANCE
GREAT BRITAIN
INDIA
ITALY
JAPAN
NEW ZEALAND
SCANDINAVIA
SPAIN
SWITZERLAND


Triefus
INDUSTRIAL DIAMONDS
TRIEFUS & CO. LTD.,
THAVIES INN HOUSE, 4, HOLBORN CIRCUS
LONDON, E.C.1. ENGLAND
Telephone : FLEet Street 9741 Cables : Triefus, London
DIAMOND PRODUCTS
TRIEFUS INDUSTRIES LTD.,
MANOR ROYAL, CRAWLEY, SUSSEX, ENGLAND
Telephone : Crawley 2244 Cables : Triefus, Crawley
DRILL BITS DIAMOND TOOLS
DIAMOND MICRO-POWDERS

INDUSTRIAL DIAMOND COMPANY (SALES) LTD.

INDUSTRIAL

DIAMONDS

FOR ALL

APPLICATIONS

ENQUIRIES INVITED

88/90 · HATTON GARDEN · LONDON · E·C·1

Telephone: HOLBORN 2642/2247 *Telegrams:* IDECE, LONDON

Consult Smit's on any question of Diamond Tools.

If you use DIAMOND TOOLS you need this catalogue

The history of Smit's runs side by side with the development of the Diamond Tool Industry. The catalogue describes and illustrates Smit's diamond tools and also outlines the manufacturing facilities for the making of any diamond tool required by any development of industry. You can ask Smit's upon any problem of Diamond application. They will be constructive to the end of giving you better work at lower cost. You will always obtain from Smit's the tool that pays you best. Write now for catalogue which can be of material assistance to you.

J. K. SMIT & SONS (DIAMOND TOOLS) LTD.

Tools Division: 22-24, Ely Place, Holborn Circus, London, E.C.1.

Telephone: ★ HOLborn 6451.

European, American and Canadian Offices:

J. K. Smit & Zonen Diamantgereedschappen (Diamond Tools) N.V., Amsterdam (C) Sarphatistraat 66, Holland
J. K. Smit & Fils, S.A., 28-30, Rue du Docteur Bauer, Saint Ouen (Seine), France
J. K. Smit & Sons, Inc., Murray Hill, New Jersey, U.S.A.
J. K. Smit & Sons of Canada Ltd., 81, Tycos Drive, Toronto, 19

MICROSTRUCTURES OF DIAMOND SURFACES

By S. Tolansky, D.Sc., F.R.S.

Read what the Reviewers say about this important book :—

This is a delightful book : firstly because it is a record of a piece of highly individual research by one school supervised and inspired by one man ; secondly, because it is superbly illustrated. Indeed, although the letterpress is easy to read, the ideas being clearly and simply expressed, it is probably the plates that will sell the book . . . Prof. Tolansky has developed new and very powerful optical techniques which actually reveal and enable him to measure surface steps or discontinuities of as little as 10 A., the effective useful magnification in such a case being X 500,000. . . . Cleavage, polishing, etching and sawing of diamond faces, octahedral, cubic, and dodecahedral, are all discussed in the light of really remarkable photographs, and some information is given on the difficult problem of " the two types of diamond."—Kathleen Lonsdale in " Science Progress."

Prof. Tolansky has been well served by the Goldsmiths' Press, whose wide experiences of diamond publishing has doubtless contributed to the success with which they have reproduced so many of his magnificent photographs of diamond surfaces. . . . Although all these methods are simple applications of well-known optical principles, it has remained for Prof. Tolansky to develop them into an extraordinary powerful array, needing skill to be sure, for their successful application, but comparatively little equipment beyond a good optical microscope to obtain one-dimensional resolution which compares favourably with that of the electron microscope. . . . The appearance of this book will be a welcome stimulant to many engaged in diamond research. It also provides valuable data for comparison with the artificial crystals of germanium and silicon, on which such an immense amount of effort is now being expended by the electrical industry. Since the stages of growth can actually be followed for these metals, comparative studies might well resolve some of the fascinating problems so literally brought to light by Prof. Tolansky's researches.—H. J. Grenville-Wells in " Laboratory Practice."

To those who use diamond as a tool, the information in the last two chapters, on " ring-crack " damage to diamonds, and on the surface condition of mechanically polished diamonds, should be specially worthy of study."—F. C. Franks.

Some of the traditionally accepted facts about diamond surfaces have been contradicted by Prof. Tolansky since he began studying the gem in his laboratory. His recent observations are described in " Microstructures of Diamond Surfaces." He reports, for instance, that tradition has it that diamonds have a perfect cleavage in particular directions. From optical studies of cleavage surfaces he says that " the cleavage is optically very far from perfect except in one type of diamond."—" Tooling and Production," Huebner Publications Inc.

CONTENTS

The Optical Techniques
Some Characteristics of Diamond
The Topography of the Natural Octahedron Faces
The Nature of the Trigons
Some Growth Features on Octahedron Faces
Linear Discontinuities on Diamonds (Slip ?)
The Etching of Diamond
Diamond Cleavage
Optical Shadow Casting
Percussion (pressure) Marks on Diamond
Polished Diamonds
143 *Special Art Plates*

NO LIBRARY ON DIAMOND IS COMPLETE WITHOUT THIS ESSENTIAL BOOK

ORDER FORM

To Book Department, NAG Press Ltd.,
226 Latymer Court, Hammersmith, London, W.6.

Please send me .....copies of " Microstructures of Diamond Surfaces," by Professor Tolansky.

Name .....

Address .....

40/- per copy, 41/6 by post. £.....enclosed.
$8.50 in U.S.A. and Canada.

Distributed in U.S.A. and Canada by Huebner Publications Inc., 1975 Lee Road, Cleveland, Ohio.

Exporters

WOLVERHAMPTON
DIAMOND DIE
& TOOL CO. LTD.

ALL GRADES OF
BOARTS AND INDUSTRIAL DIAMONDS

11 HATTON GARDEN LONDON E.C.1

TELEPHONE HOLBORN 3017 CABLE PARDIMON LONDON

Diamond Impregnated, Metal Bonded, Wheels and Laps

designed for life and speed

Indusmond's Diamond Impregnated tools have been designed to meet the demands of industry. Widely tested and now accepted as a standard throughout the country, these Wheels and Laps have been proved for longer life, faster cutting, and a minimum of loading during operation. Trained technical representatives in all parts are at your service and fuller information is available from either of our regional offices.

INDUSMOND (DIAMOND TOOLS) LTD

4, GREVILLE ST., LONDON E.C.1. ● *Phone* CHANCERY 7608/9
N. Office : SUSSEX ST., SHEFFIELD 4. ● *Phone* SHEFFIELD 20701

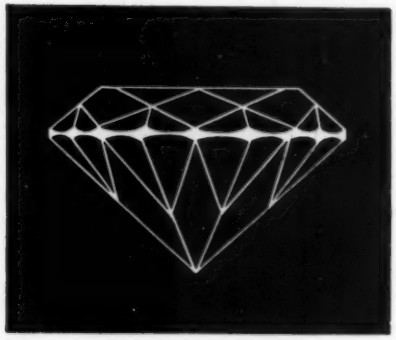
impregnated tools ● polished tools ● dressing tools ● a complete Diamond Tool Service

D. DRUKKER & ZN. N.V.

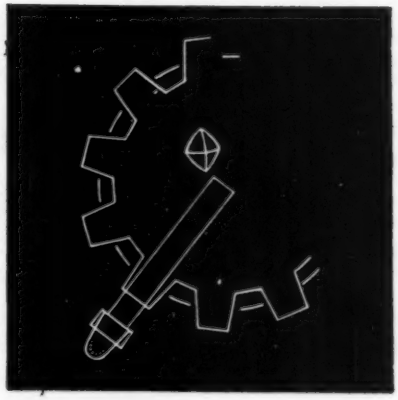
SPECIALISTS in

INDUSTRIAL DIAMONDS

cleaving and sorting



diamonds in art and industry



amsterdam, holland.

12 sarphatikade

phone : **67321** (3 lines)

cable : **DUBBELDEE.**

If you are interested in our products please visit our works

INDUSTRIAL DIAMOND REVIEW

Vol 19 No 219
FEBRUARY 1959

Editor-in-Chief :
Eric M. Bruton

Managing Editor :
Patrick Greene

★

© 1959 *N.A.G. Press Ltd.—All rights reserved.*

PRINCIPAL CONTENTS

Generally Speaking — **Adamant** — **25**
Cutting Experiments with Plate Glass — **M. Hara and J. Nakayama** — **26**
Grinding Sintered Carbide, especially Sintered Carbide Cutting Tools, with Diamond Grinding Wheels (Cont.) — **G. Pahlitzsch and G. Rafflenbeul** — **35**
Glass Cutting for the Amateur ... ... — **37**
This Could Happen to *Your* Diamond Bits ... — **38**

★

Industrial Diamond Review is published monthly at 1s 3d per copy, and is obtainable through newsagents and booksellers or by postal subscription (15s yearly, post free). Subscriptions in the United States of America are $2.50, and can be entered through the usual subscription agencies or direct through the publishers :—

N.A.G. Press Ltd
226 Latymer Court
London W.6.
(Telephone : RIVerside 2143).

★

Contributions of scientific, technical and practical interest, and news items, are invited, but responsibility cannot be accepted for the safety of MSS, drawings, photographs or other matter submitted. Material not accepted will be returned.

★

All editorial communications should be made to the Managing Editor at
2 Charterhouse Street
London E.C.1
(Telephone : FLEet Street 1577)

Printed by
Martin's Printing Works Ltd., Berwick-upon-Tweed, England

Generally Speaking

Black and White

A large part of this month's *Times Review of Industry* is devoted to the activities of the National Coal Board, from exploration to final delivery of the coal, and including all the many and varied things that happen between the first survey of a possible coal-bearing area to its final use, as fuel or as the source of a vast number of chemical products.

A frequently-used method for determining whether or not the underlying layers at any given point are coal-bearing is diamond drilling, using coring crowns, and this method is in fact in use in a number of places within the Board's jurisdiction at the present day. Drilling of this sort is taking place not merely on land but also at sea, and the frontispiece of the *Times Review of Industry* shows one of the off-shore drilling platforms used for this purpose.

Not so New

Diamond coring for finding (or at least for trying to find) coal measures is nothing new in this country, however, although the first attempt of which we have any record was not a success as far as the discovery of coal was concerned. It took place eighty-five years ago at Rampside in the Lake District, and, although some very fine cores were produced, no coal was found. This is a district in which mineral getting has been practiced since pre-Roman days, and it is evident that they have believed in keeping themselves well up to date.

Gently does it

A well-known land mark in New Hampshire, USA, the Old Man of the Mountains, a gigantic natural man-like profile, has been in danger of collapse, and has been the subject of a considerable amount of underpinning and general patching recently. Owing to the precarious state of the rockface, the greatest possible care was necessary to ensure that the repair work did not do more harm than good, and to make quite certain that the necessary holes for tie-rods could be bored with the minimum of vibration and

damage to the surrounding stone, it was found necessary to use diamond drills.

The Physical Society Exhibition

The Physical Society held its annual exhibition of scientific instruments at the Horticultural Halls from January 19th to 22nd inclusive. It is not proposed to give a general report of the exhibition in this journal, but to give individual reports on those items shown that would be of especial interest to our readers, with, wherever possible, details of practical tests. We feel that this is likely to be more useful than a simple review of the exhibits.

ADAMANT.

Cutting Experiments With Plate Glass

by M. Hara *and* J. Nakayama

The mechanism of the cutting process is discussed, and an experimental set-up for scratching glass is described. The depth of the vertical slit of the diamond cut and the bending strength of the scratched plate glass are measured in relation to the various cutting conditions for glass samples varying in their heat treatment. It is shown that the residual stress and the density of the glass affect the cutting efficiency, and that oil lubrication (on the trace) makes the cutting easier. Causes are discussed for the separating fracture cleaving away from the course of the trace.

1. General information about the cutting process and the formation of a cut

Because of its brittle nature, glass cannot be cut, but only split. The effect of the cutting apparatus is, therefore, only the formation of a groove which can control the course of the cleavage. The material of the cutting tool must, of course, be harder than glass, so small diamonds or small wheels of special steel or silicon carbide are used, mounted on a suitable shank. The point of the glass cutting diamond is formed by four faces, the section at right angles to the cutting direction forming an angle of about 140°. The section in the direction of the trace does not, however, form a simple angle with straight edges, but a rather curved outline, shown, for example, in Fig 10 and 11. The wheel for glass cutting is a disk with a polished sharp edge. The angle in the section across the cutting direction is somewhat smaller than that of the diamond, and usually amounts to 130°. In order to examine the shape of a diamond point, the diamond is pressed into a perspex surface in the cutting position, and the impression is examined under a microscope with slanting illumination. This method is very convenient for the practical testing of the point. The shape and wear of the diamond and the wheel can be checked in this way, (compare Fig 1 to 5).

Fig 1 (Left). Impression of a new diamond point (magnif × 100).
Fig 2 (Right). Worn diamond point (magnif × 100).

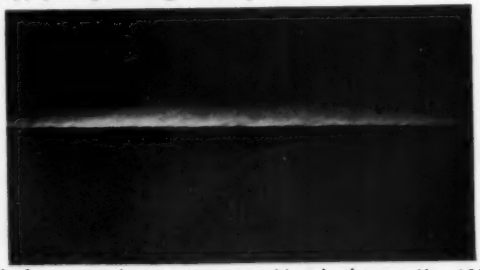


Fig 3. New point of silicon carbide wheel (magnif × 100).

The cross-section of a good cut shows, as already known (1) (2), two shallow fissures running beneath the surface, and one slit going vertically into the centre; the latter facilitates the cleavage along the cutting line. This vertical slit is formed by the knife-like action of the diamond's edge, a sharp point such as that of a gramophone needle being unable to cause a vertical slit. A picture of a cut is shown in Fig 6. To a depth of from 10 to 20 micron the glass is shattered under the pressure of the diamond,

The expression ' kp ' which occurs several times in this article is the abbreviation for the German ' kilopond '. The term ' pond ' is simply a substitute for ' gram ' ; it is used in order to distinguish between measurements of volume and energy.

Fig 4 (Left). Worn point of silicon carbide wheel (magnif × 100).
Fig 5 (Right). Worn point of special steel wheel (magnif × 100).

and small cracks intersect each other. Below this, at a depth of about 1 mm, are the so-called rib curves. The perpendicular slit usually extends to below the rib region to where the arrow points in Fig 6. If the cutting tool is under less pressure, the width of the cleavage ribs decreases and the distance between the curves becomes greater. With very light pressure the ribs disappear completely; the perpendicular slit, however, remains. Light pressure is particularly suitable for cutting thin glass plates to small depths (*eg* microscope slides).

2. The cutting apparatus used

The character of the diamond cut on the glass surface varies with the angle at which the diamond is applied. The skill of the glass cutter lies, therefore, in keeping the diamond inclined at the correct angle during cutting. With the apparatus used for cutting in the following experiments (Fig 7), the angle of the diamond can be varied in three directions through ranges of 8 degrees. The appropriate angular adjustment can be made by means of micrometer screws to within an accuracy of 5 minutes. Thus the angle at which the diamond is to be set can easily be stipulated, and the influence of small angular variations on the cut can be studied. The diamond is applied to the glass by means of a parallel guide. The apparatus is suitable for finding the influence of the load as well as that of the angle. The friction occurring during the experiment caused an inaccuracy of 10 to 20 p

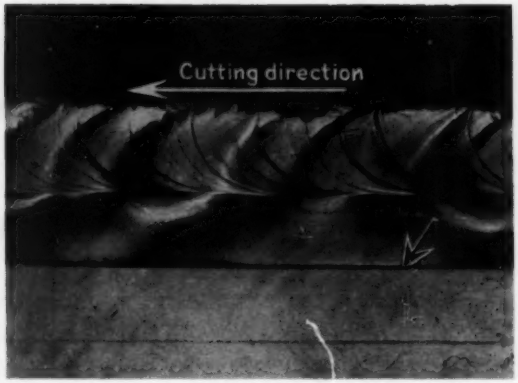


Fig 6. Cleavage edges of a glass plate with a satisfactory cut (magnif 120×); arrow: front edge of vertical slit.

in a total load of 500-3,000 p.

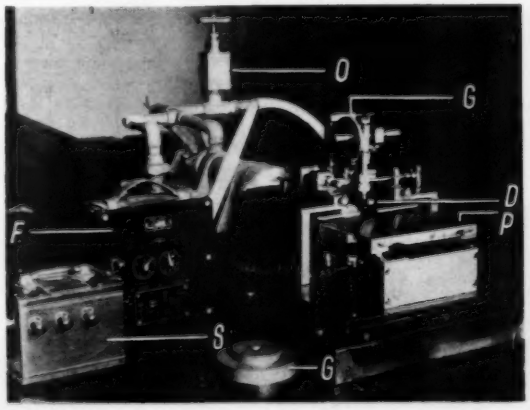
The glass specimens (about 12 × 12 sq cm), which were to be cut, were put on a sliding mount, and this was moved by means of a hydraulic device. The speed of its movement could be varied from 3 to 50 cm/second. A frequency counter registered the time required by the holder to go through the stipulated space.

3. The depth of the vertical slit

In order to weaken the cohesion of the glass plate to the degree which will allow it to break, the vertical slit must reach a certain depth. To explain the working of the diamond more completely, it is therefore helpful to measure how deep the vertical slit goes under different cutting conditions.

The vertical slit continues to extend after the completion of the cut. If the depth is compara-

Fig 7. Test apparatus. D: diamond; G: weight; P: specimen holder; F: frequency counter; S: switch; O: hydraulic drive apparatus.



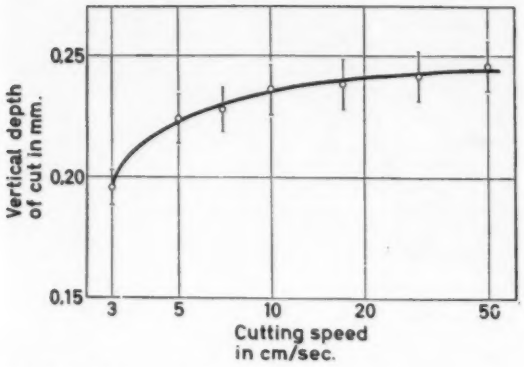


Fig 8. Relation of slit depth and cutting speed. The probable 90% limit of the average value is shown.

tively small, it usually stops after a few minutes. If the depth of the slit is fairly great, however, the splitting occurs through nearly the entire depth of the glass plate. It appears that the stress remaining in the glass is responsible for this. Force cooled plate glass clearly shows a region of compressive stress on the surface and of tensile stress within. The compressive stress occupies $\frac{1}{8}$ of the whole glass thickness. It is obvious that a crack extending into the region of tensile stress easily expands further, until it reaches its limit in the compressive region on the other side.

For measuring the depth of the slit, the glass sample was divided into several strips at right angles to the test cut. The dividing cuts necessary for this were made on the back of the plate, so that the original cut remained unspoiled. The depth of the slits on the cut surface of the different strips was measured by means of a microscope with ocular scale.

The measured depth of slits is shown in relation to the drawing speed of the diamond in Fig 8. The depth of slit shows a remarkable decrease with slower diamond movement, but no significant change considering the measurement error at speeds above 10 cm/second. In all the following measurements a speed of 20-30 cm/sec was used.

The slit depth in relation to the cutting pressure is shown in Fig 9: the depth increases with the tool pressure up to a maximum, and then decreases (Fig 9). As soon as the slit depth exceeds $\frac{1}{8}$ of the glass thickness, however, it automatically goes deeper through almost the entire depth of the glass. It appears that the diminishing of the slit depth at too great a pressure is caused by the diamond biting into the glass. The diamond then causes a great deal of destruction on the glass surface which interferes with the splitting process.

Fig 9. Influence of pressure and relative setting angle of diamond. 0°, 1° ; 2°.

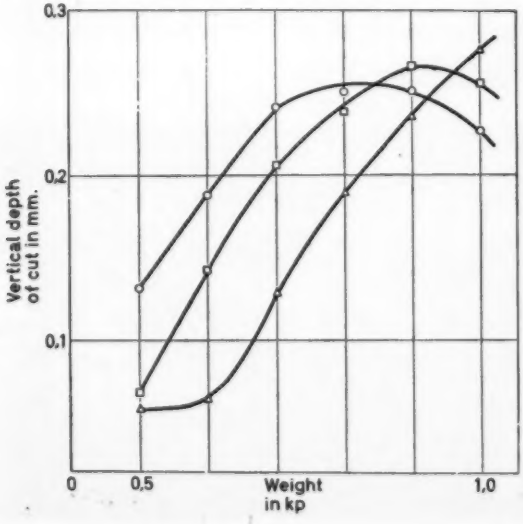


Fig 10. Profile of a diamond point for cutting on a thin plate (magnif × 100).

Fig 11. Profile of a diamond point for cutting on a thick plate (magnif × 100).

The inclination of the diamond holder to the cutting direction also has a notable effect on the slit depth (Fig 9). If the diamond is applied at a steep angle, the slit depth is large even at low pressure, and with an increase in pressure it quickly reaches the maximum. If the diamond is more inclined, the slit depth at a small pressure is less and the maximum of the slit depth moves

ALL OVER THE WORLD

B·O·A·C

TAKES GOOD CARE OF YOUR CARGO

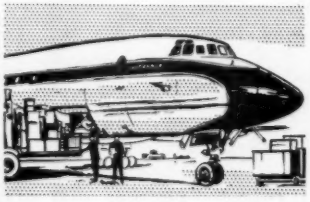
Fly goods BOAC—for fastest delivery by modern airliners to most of the world's important centres. BOAC's new London Airport warehouse offers expert staff plus unrivalled handling facilities (transhipment only takes an hour!). And BOAC Appointed Shipping and Forwarding Agents work with BOAC to streamline collection, Customs clearance, handling and delivery. For advice, just ring BOAC and ask for "SKYLOAD"—your direct link with the freight expert.

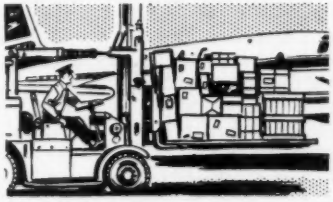
ACROSS THE ATLANTIC

Fastest overnight service to New York. Special collection nightly (Mondays to Saturdays) from Paddington, Euston, St. Pancras and King's Cross for same-night despatch. Also frequent services to Boston, Detroit, Chicago and San Francisco . . . to Montreal . . . and to Bermuda, Nassau, the Caribbean and Caracas.

SERVICES TO ALL AFRICA

The whole of Africa is well-served by BOAC. Choose from many swift services between London and East, Central and South Africa; also to Nigeria and Ghana. There is ample cargo capacity on all routes.





MIDDLE EAST FAR EAST AND AUSTRALIA

BOAC offers you an excellent cargo service to important countries throughout the East and to Australasia. They include Iraq, Persia, Pakistan, India and Ceylon, Malaya, Hong Kong, Japan, Australia and New Zealand.

YOUR CARGO GETS THERE FASTER BY JET-PROP BRITANNIA
—NOW OPERATING ON MOST ROUTES

BRITISH OVERSEAS AIRWAYS CORPORATION WITH ASSOCIATE AIRLINES

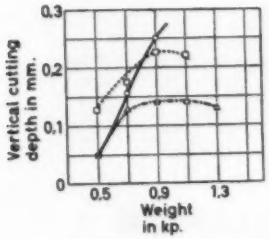


Fig 12. Influence of thickness of specimen on perpendicular slit depth: o—o 1.8 mm thick (not heat-treated; △-△ 5.0 mm thick (not heat treated); □-□ 5.0 mm thick (heat treated).

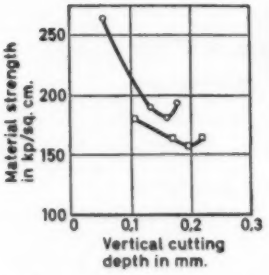


Fig 13. Relation between material strength and slit depth in thin plates. o—o not heat treated; □-□ heat treated.

in the direction of higher pressure. The ultimate depth achieved, however, is greater than it would be if the diamond were applied perpendicularly. It was further found that a diamond with a sharp point is better for cutting with slight pressure, while a diamond with a blunt point is better with greater pressure, when a great depth is required (compare Fig 10 and 11).

Under otherwise identical conditions, the slit depth is also influenced by the thickness of the glass specimen. The maximum depth is not as great with thick plates as with thin ones, even when the first is stress relieved (Fig 12). In general, a deeper slit is formed in a thin plate, if a diamond suited for cutting a thick plate is used under the same conditions, and it may penetrate almost the entire thickness. In practice it is desirable, however, that the separation should take place only after completion of all necessary cuts; which is why the deep slit, which may well lead to complete cleavage with a light blow on the opposite side, is regarded as unsuitable for cutting thin plates. Thus one may say that the sharp point is suitable for thin plates and the blunt point for thick plates. Furthermore, it is interesting that the wear of the point with use in Fig 9, has the same effect as the widening of the angle of inclination.

4. Bending strength and slit depth

The connexion between material strength of the scratched plate of glass and the depth of slit will now be examined. In the experiment, two test series of stress relieved and force cooled glass were chosen.

With thin plates of 1.8 mm thickness, the slit depth (with not too great a load) increases with the pressure, and at the same time the material strength decreases gradually. The relation between the slit depth and material strength is shown in Fig 13. As can be seen, the two curves of the two test series show good agreement. With an increase in slit depth the material strength decreases quickly to about 120 kp/sq cm. This is about $\frac{1}{4}$ of the material strength shown by the uncut glass.

With thick plates of 5 mm thickness, the material strength reaches a minimum, which is followed by a new increase, even when the slit depth is still increasing with cutting pressure. But the lowest strength value obtained depends upon the heat treatment of the specimens (Fig 14). Also the depth of the vertical slit, which corresponds to minimum strength, is variable.

The material strength of plates scratched with a certain diamond was measured for variously heat treated specimens. The cooling conditions affect not only the remaining stress in the glass, but also its molecular structure, which is measured by the change in its density. In order to produce specimens of differing density and stress the following heat treatment was used.

The temperature of the electric oven used was accurately programmed. The specimens, placed on a rack, could be pushed quickly in or out of the oven on a slide. The specimen pulled out of the oven was cooled either by

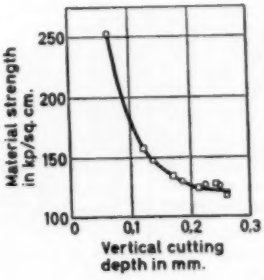


Fig 14. Relation between material strength and slit depth with thick plates. o—o not heat treated; □-□ heat treated.

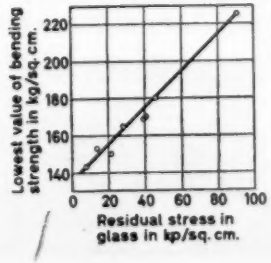


Fig 15. Smallest degree of material strength and residual stress in glass (in plates 5 mm thick).

QUENCHING OILS

No. 2 and No. 3 Soluble Quenching Oils stand supreme in providing uniform quenching speed and years of service throughout a wide temperature range. They outlast other quenching oils and, based on ultimate cost, are the most economical to use.

Technical data sent on request.

Edgar Vaughan & Co. Ltd.

BIRMINGHAM · 4 · ENGLAND

Works and depots at : Birmingham, Manchester, Liverpool, Southall (Midds.), Bristol, Glasgow

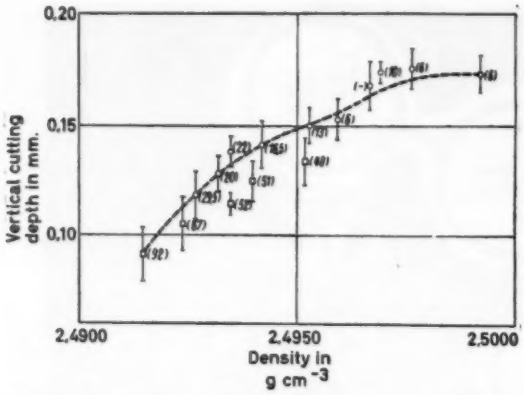


Fig 16. Perpendicular slit depth and thickness of glass. Cutting load : 0.7 kp. Thickness of specimen : 1.8 mm. □ : force cooling, o : natural cooling. ( ) : residual stress.

natural convection or force cooled by compressed air acting from both sides. The density of the glass is mainly determined by the temperature and duration of heating in the oven, whereas the stress is governed mainly by the speed of cooling outside the oven. The stress measurement was made by a stress optical method of Senarmont, and that of the density by the immersion and flotation method. In the tests, the cutting pressure was increased by increments of 0.1 kp up to the point where the strength of the specimens seemed to reach its minimum.

The results of glass plates 5 mm thick are collected together in Table 1. If the relation is examined between residual stress and minimum material strength, a linear law will be found, as is shown in Fig 15. Thus we have the formula: minimum material strength = stress + constant.

TABLE I.
Influence of heat treatment on the rigidity of scratched glass plates

Type of heat treatment	Cooling process after heat treatment	Remaining residual strength (compressive strength on the surface) (kp/sq cm)	Density (g/cu cm)	Cutting load (kg)	Vertical depth of cut (mm)	Rigidity (kp/sq cm)
Untreated	—	40	2.4932	0.8 0.9 1.0 1.2	0.075±0.003 0.156±0.006 0.188±0.007 0.213±0.003	240±8 174±4 170±8 179±10
560 deg C, 30 min	natural	91	2.4922	0.9 1.0	0.117±0.029 0.159±0.008	226± 22 226±3
540 deg C, 60 min	natural	39	2.4943	0.8 0.9 1.0	0.121±0.033 0.186±0.008 0.205±0.006	186±25 169±4 177±3
10 deg C/min fr 570 deg C to 500 deg C	natural	21	2.4944	0.8 0.9 1.0	0.103±0.035 0.190±0.014 0.207±0.005	190±25 150±9 156±8
2 deg C/min fr 570 deg C to 500 deg C	natural	14	2.4958	0.8 0.9	0.182±0.007 0.202±0.024	152±5 152±4
2 deg C/min fr 570 deg C to 500 deg C	fast	46	2.4956	0.8 0.9	0.104±0.015 0.140±0.006	186±9 180±8
2 deg C/min fr 570 deg C to 470 deg C	natural	8	2.4968	0.8 0.9	0.198±0.012 0.218±0.009	147±8 143±4
2 deg C/min fr 570 deg C to 470 deg C	fast	28	2.4966	0.8 0.9	0.170±0.004 0.182±0.005	165±5 165±5

With thick plates, the depth of the perpendicular slit is much smaller than the thickness of the plates, so an increasing force is required to overcome the residual strength. It is also noticeable (Table 1), that the material strength has a smaller minimum value, as the glass is thicker. This shows that the density, *ie* the structure of the glass, exercises its own influence on the ' slitability.'

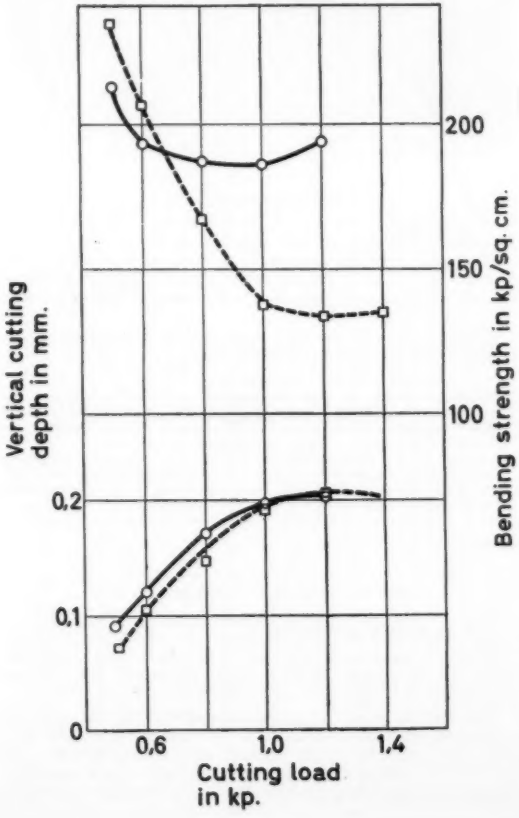
In order to make the effect more evident, slit depths obtained under different heating and cooling conditions, with constant tool pressure, were measured for specimens of 1.8 mm thickness. The resulting relation between density and slit depth is shown in Fig 16. The residual stress

naturally also affects the slit depth, but the density has the greater influence on the slit depth. With greater densities, *ie* in structurally stabilized glass, the slit extends more readily to a greater depth, even if the stress is comparatively great. If this slit depth is regarded as a hardness measurement of a brittle object, the experimentally produced conclusion may be expressed as follows: the structurally unstabilized glass is harder than the stabilized glass. It is, however, not yet clear whether or not this concept of hardness bears a relation to the Vickers hardness.

5. Effect of lubricating with paraffin

It has been known for a long time that lubrication with light paraffin makes glass cutting easier. It is naturally expected that the effect of lubrication should be visible in the distinct structure of the cut. For this reason the material strength and the slit depth of the glass lubricated with paraffin were compared with those of dry

Fig 17. Influence of paraffin (force cooled glass); dry, under paraffin.



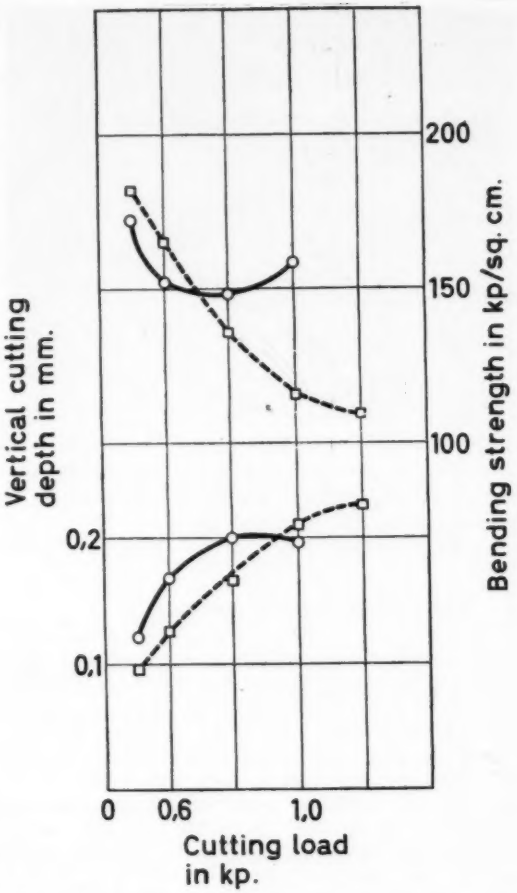


Fig 18. Influence of paraffin (stress relieved glass); o—o dry, □- -□ with paraffin.

glass, both for force cooled and for stress relieved glass. The results are shown in Fig 17 and 18. With lower tool pressure, the slit depth when paraffin was used was smaller and the material strength correspondingly greater. The slit depth, however, reaches its maximum at higher tool pressures with paraffin lubrication than in dry cutting. Thus the minimum material strength falls, dropping from 180 kp/sq cm to about 140 kp/sq cm, and from about 150 kp/sq cm, to about 110 kp/sq cm for the two types of specimens. The advantage of the use of paraffin in reducing material strength by about 30% is beyond doubt (3). The results seem to indicate that the friction during cutting under slight pressure helps the effect of the diamond, but

1 R. Ramsauer obtained similar results (3).

Fig 19. Cleavage lines on cleaved surface.

that it prevents, under greater loads, the vertical slit from going deep and the stress from concentrating on the point of the slit. The lateral slits are generally fairly short when paraffin is used.

6. The faultily formed cleavage

When cleaving the plate it is difficult to make the break run along a badly formed cut, but even with a good cutting trace the break often leaves its course. Thus one may often pick out numerous cleavage lines, so called 'lancet cleavage lines,' on the surface which has been cleaved (Fig 19), and the cleavage surface seems to be very rough. At the point where the cleavage deviates from the cut, the lancet lines are curved in wide arcs in a direction parallel to the surface of the glass, and back to it, so that (Fig 20) the cleavage surface is no longer perpendicular to the surface. The appearance of the cleavage lines shows that the force in the cleaving was not applied at a right angle to the cut, and, further, that the cleavage occurred earlier at some point of separation within rather than on the surface. If the cleavage started on the surface, it could not deviate from the slit, because the vertical slit is already formed and directs it. In contrast to this, the cleavage which forms of its own accord within the glass readily deviates from the proper course. As the residual stress in the glass occurs as compressive stress on the surface and as tensile stress in the interior, the early internal cleavage is enhanced by the stress in the glass. The stress in the glass thus makes it difficult to cut, because the pressure on the surfaces increases the strength of the scratched glass and the tensile stress within gives rise to the danger of deviation of the cleavage surface from its course.

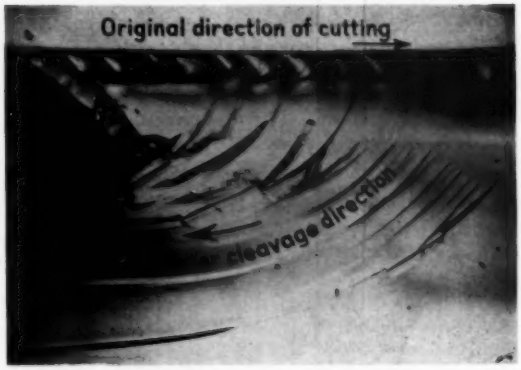


Fig 20. Point of deviation of cleavage from the prescribed course.

Acknowledgements

The editors thank Mr. S. Suetoshi and Mr. N. Shibata for their valuable advice and active help, and Mr. Y. Kawaguchi for his support in the experiments. We should like to give our heartfelt thanks to Dr. F. Kerkhof for discussions and help in the translation (into German) of our work.

Translated and reprinted with kind permission from *Glastechnische Berichte* 1958 Vol 31 (10) pp 381-386 (Oct).

References

[1] Jebsen-Marwedel, H., and von Stoesser, K. Der Mechanismus des Schneidens von Glas und die Schwaechung des Glases durch den Schnitt—*Glastechn Ber* 1939 Vol 17 pp 1-11; IDR Reprint 146 (In English).

[2] Jebsen-Marwedel, H. Tafelglas. Girardet, Essen, 1950.

[3] Ramsauer, R. Freie Grenzflaechenenergie und Spannungsausloesung an sproeden Koerpern—*Naturwiss* 1953 Vol 40 p 336; see also Ueber Schneidversuche an Glas und die Wirkung der Schneidfluessigkeit—*Glastechn Ber* 1953 Vol 26 p 296 (technical abstract).

Wolf Appoint Home Sales Manager

Mr. F. L. Gibson has been appointed Home Sales Manager for Wolf Electric Tools Limited.

Abrasive Belt Dressers

Finishing Aids and Tools, London SW 1, are marketing a rotary dressing tool for cleaning abrasive belts. The 'cleaning' is performed by a wire rotary brush mounted on a 9½ in. handle.

New Particle Size Analysis Service

Particle size distribution data is being made available by Particle Data Laboratories Inc, of Elmhurst, Illinois, through the use of a new technique known as the Coulter principle. This principle involves high speed electronic counting of particles at different size levels with a Coulter counter.

Particles as small as one-half micron can be counted successfully. Counts are made at rates up to 5,000/sec, thus producing data with excellent statistical accuracy. By counting at several different size levels, data for a complete distribution curve can be obtained in a matter of minutes.

Grinding Sintered Carbide, Especially Sintered Carbide Cutting Tools, with Diamond Grinding Wheels

by

G. Pahlitzsch *and* G. Rafflenbeul

Continued from p 19, *January*

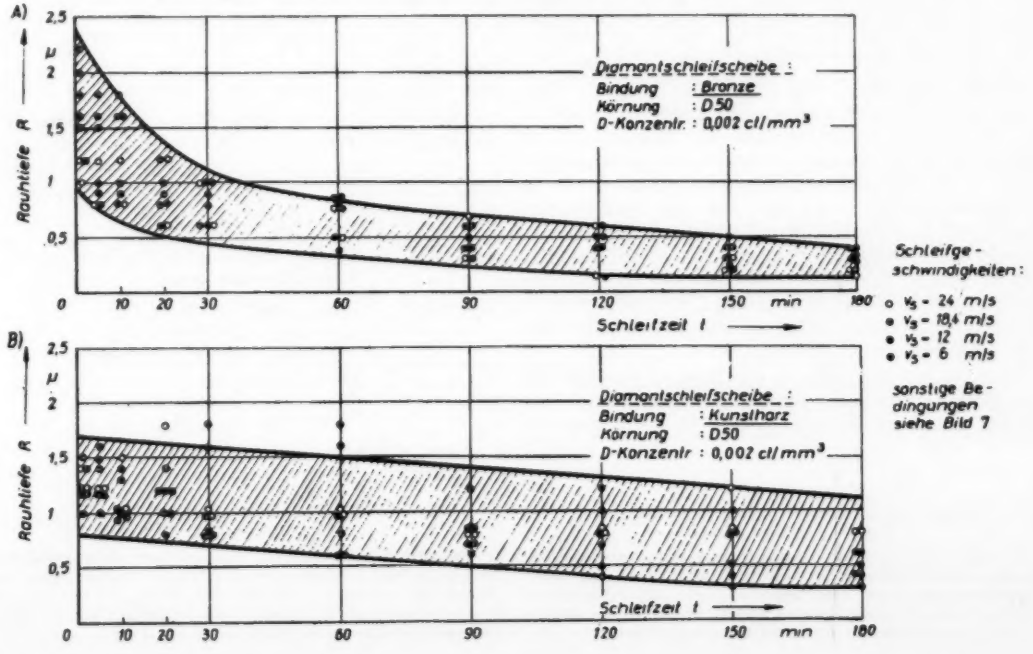
4.23 Surface finish of the ground sintered carbide surfaces

The blunting of the diamond grinding wheel, or rather the diamond grains which take part in the grinding process, is noticeable in an improvement of the surface finish of the ground sintered carbide. In Fig 9 the surface finish for all the grinding speeds applied with BZ and K wheels is recorded. A separate representation for the various grinding speeds could not be carried out, as considerable overlapping occurs after only a very short period of grinding.

For the BZ wheels there is very good conformity of the band of observed surface finish with the abrasion graph. There is, then, a connexion between the blunting of the wheel, or grain, the loss of abrasive powder, and the improvement of surface finish in relation to the grinding time, in which, however, surface finish observations are subject to a certain scatter. The influence of the grinding time is particularly noticeable with a dressed wheel having a good adhesion. The surface finish produced after 1 and 180 grinding minutes is recorded for BZ wheels in Fig 10A. The initial surface finish improves with increased grinding speed, because the initial blunting of the sharpened wheel, which is especially sensitive to wear, occurs more quickly at high speed than at low speed. The differences after 180 grinding minutes are, on the other hand, insignificant.

The surface finish obtained with the K wheels (Fig 9B) is somewhat lower than that obtained

Fig 9. Finish of the polished surfaces in relation to the grinding time for BZ and K wheels of like mesh size and diamond concentration.
Translation: *Rauhtiefe R = surface finish R; Diamantschleifscheibe = diamond grinding wheel; Bindung: Bronze = bond: bronze; Koernung: D50 = mesh size: D50; D-Konzentr.: 0.002 ct/mm³ = diamond concentration: 0.002 ct/cub mm; Schleifzeit t = grinding time t; Bindung: Kunstharz = bond: resin; Schleifgeschwindigkeiten: v_s = grinding speeds: v_s; sonstige Bedingungen siehe Bild 7 = for other conditions see Fig 7.*



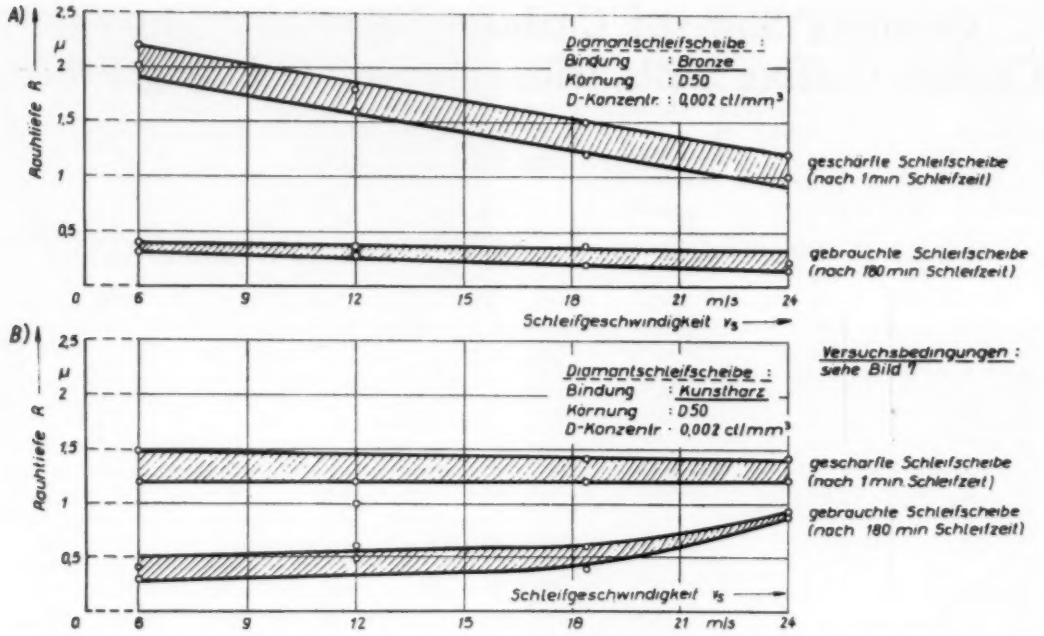


Fig 10. *Finish of the polished surfaces after* 1 *minute or* 180 *minutes of grinding, in relation to the grinding speed for BZ and K wheels of like mesh size and diamond concentration.*
Translation: *Rauhtiefe R = surface finish R; Diamantschleifscheibe = diamond grinding wheel; Bindung: Bronze = bond: bronze; Koernung: D50 = mesh size: D50; D-Konzentr.:* 0.002 *ct/mm³ = diamond concentration:* 0.002 *ct/cub cm; Schleifgeschwindigkeit v_s = grinding speed v_s; Bindung: Kunstharz = bond: resin; geschaerfte Schleifscheibe (nach* 1 *min Schleifzeit) = sharpened grinding wheel (after* 1 *min grinding time); gebrauchte Schleifscheibe (nach* 180 *min Schleifzeit) = consumed grinding wheel (after* 180 *min grinding time); Versuchsbedingungen: siehe Bild* 7 *= experiment conditions: see Fig* 7.

with the BZ wheel, for with the K wheel bond wear occurs, which leads to continual regeneration of the grinding surface and the engagement of fresh diamond grains. The band of observed values plotted above the grinding time shows a slight tendency to decrease, without the development of particularly low surface finish in the newly sharpened grinding wheel. The grinding speed has at first little influence on the surface finish (Fig 10B), whereas after a grinding period of 180 min an increase in the roughness with the grinding speed is noted.

For BZ wheels only in the first 10 minutes of grinding, *ie* with sharp wheels, is greater roughness found than for K wheels (Fig 9). A change in the grinding speed has contrasting effects, especially after a longer period of grinding, with BZ and K wheels (Fig 10).

The following limits hold true:

BZ wheels: after 1 min grinding time
$R = 1.0 \ldots 2.5$ micron
after 180 min grinding time
$R = 0.5$ micron

K wheels : after 1 min grinding time
$R = 1.0 \ldots 1.5$ micron
after 180 min grinding time
$R = 1.0$ micron

(To be concluded)

American Coldset Appointed Agents for J & S Contour Dresser

J & S Tool Co. Inc., N.J., announce that the American Coldset Corporation, Teterboro, N.J., diamond tool manufacturers, have been appointed national distributors for the U.S. and exclusive sales agents for the J & S contour truing device for cylindrical and surface grinders.

Rock Mechanics
US Symposium for 1959

The 3rd Symposium on Rock Mechanics, sponsored jointly by the Departments of Mining Engineering at the Colorado School of Mines, Minnesota University, and Pennsylvania State University, will be held at the Colorado School of Mines from April 20 to 22, 1959.

Glass Cutting for the Amateur

The mechanism of glass cutting and the properties of glass have been the subject of considerable research by experts[1], whose treatment of the subject is necessarily involved and detailed. By combining the basic conclusions and recommendations of the experts the following information has been derived.

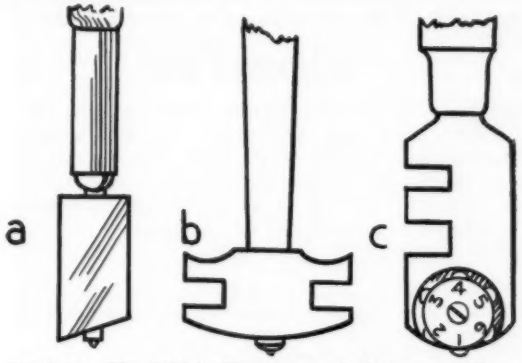
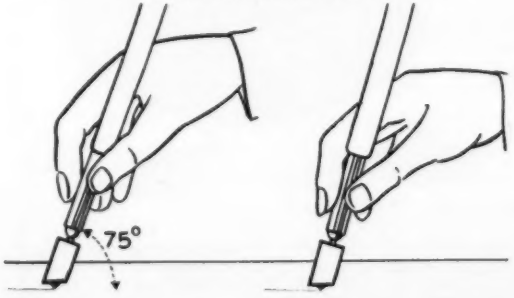


Fig 1 (a). *The British (Shaw) type of glass cutter allows the diamond freedom of movement to adjust itself to the direction of the cut.* (b). *The German type of glass cutter features a diamond mounted on a fixed shank.* (c). *Steel wheeled glass cutter.*

Types of glass cutter and cutting method

There are three basic forms of glass cutter (Fig 1), two of which use diamond. All of these are in common use today, but these notes relate only to type (*a*), *ie* the British, flat-edged diamond glass cutter. When cutting it is most important to place the sheet of glass on a plane support. For cutting straight lines, a straight edge should be placed along the intended direction of cut and the diamond, held in one of the positions shown

Fig 2. Position of the hand in glass cutting. The bottom edge of the cutter should be parallel to the glass being cut. Once the cut is commenced the position of the wrist should be maintained.



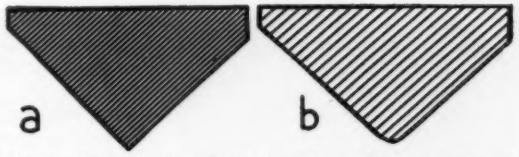


Fig 3. Ground diamond point (a), *and wear produced after 100 cuts*[2]. (b). *Inferior to natural diamond point (see Fig 4).*

in Fig 2, should be drawn along the glass using only a light pressure. The angle of the cutter should remain constant during the whole of the cut. If no cut results, the angle of the holder should be altered slightly until a good cut is obtained. If a bad cut is made, do not attempt to re-cut along that line; this could cause damage to the diamond.

Parting the cut

Parting or ' breaking ' along the cut is easier if petrol, paraffin, or even water is used to wet the cut. The glass is placed on the supporting plane so that the smaller part to be parted protrudes about 1 to 2 in. over the edge of the support. The steel holder of the glass cutter is then used to tap the reverse side of the cut in order to produce

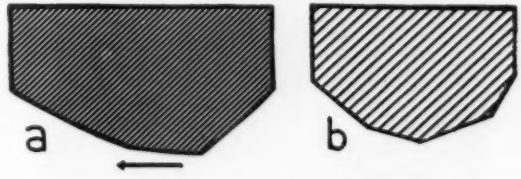


Fig 4 (a). *Natural edge of a diamond in direction of cut (arrow), and* (b) *cross section*[2].

a crack along the length of the cut. The glass is then moved until the cut just protrudes beyond the end of the support. Pressure applied to the protruding piece of glass should produce a clean parting.

References

1 H. Jebsen-Marwedel, K. von Stoesser, P. Grodzinski, and others.
2 A. J. Holland, W. E. S. Turner.

CHANGE OF ADDRESS

Triefus and Co Ltd, and Pittar Leveson and Co Ltd, importers and exporters of rough and cut diamonds and precious stones, of 32 Holborn Viaduct, have moved into new premises at Thavies Inn House, 4 Holborn Circus, London EC1. They occupy the seventh and eighth floors. It is an interesting fact that the late Edward Triefus founded the business in 1881 at the same place.

This *could* happen to your diamond bits...

A fact which is constantly impressed on users of diamond tools is that, with care, the life of a tool can be extended considerably. These illustrations show that the obverse is equally true : without care, the life of diamond tools can be reduced to a fraction of their potential. The top picture shows a bit which was grossly abused, probably being run at high speed with a piece of core choking the mouth. A side containing diamonds then broke off and, judging by the depth of the scoring on the bit walls, chewed up the rest of the bit.

* * * *

The ' before and after ' illustration below shows, on the left, a brand new bit set for hard rock drilling ; it contains a large number of small diamonds. The bit on the right shows a similar bit after two days of operation. It was, apparently, run dry, and became so hot that the metal fused into a mass. When examined, the metal was so brittle that pieces flaked off the sides.

* * * *

We thank the Acker Drill Co Inc, Scranton, Pa, for allowing us to adapt this feature from their publication ' Basic procedures of diamond and shot core drilling,' available from the Company at a price of $1.

Trade Fairs in Belgium

Two international trade fairs will be held during the end of April and the beginning of May this year, that at Brussels from April 30th to May 11th, and the Liege fair from April 25th to May 10th. A very wide variety of industries will be showing at each of these fairs, including many of the branches of engineering. Further details of the Brussels fair can be obtained from Belgian Railways and Marine, 167 Regent Street, London, W1, and of the Liege fair from R. C. Liebman, 178 Fleet Street, London, EC4, or from the fair authorities direct in either case.

DIAMANT BOART

DIAMOND IMPREGNATED TOOLS
ARE USED ALL OVER THE WORLD

Wheels

Saws

Drill Bits

Truing and dressing tools ∴ Hones Boring Crowns
Dental Tools

74, avenue du Pont de Luttre, Brussels, Belgium

Sole representative in U.K.: **Compentrad Ltd, 31, Throgmorton Street, London, E.C.2**

DIAMOND TECHNOLOGY

By PAUL GRODZINSKI

The standard work on the subject and the only book of its kind in the world. Based on traditional craftsmanship, it also includes all modern methods. Subjects dealt with cover : dividing gemstones and diamonds, bruting, grinding and polishing gemstones and diamonds, carving and engraving, polishing gemstones for jewellery, as well as every industrial use and technique.

840 pages 500 illustrations 94 tables

Price **52s. 6d.** (by post **54s. 6d.** inc. pack). U.S.A. and Canada **$10.**

Publishers :
N.A.G. PRESS LTD.
226 Latymer Court,
Hammersmith, London, W.6

U.S.A. Supplies through :
HUEBNER PUBLICATIONS INC.,
1975 Lee Road,
Cleveland, 18, Ohio, U.S.A.

THE HENDERSON DIAMOND TOOL COMPANY LTD.,

43-45 ALLESLEY OLD ROAD, COVENTRY
Telephone : Coventry 75617

MANUFACTURERS OF DIAMOND TOOLS.

ALL TYPES OF ABRASIVE DIAMOND TOOLS
RESET AND RETURNED WITHIN **48 HOURS**
OF RECEIPT AT THE ABOVE OFFICE.

TOOLS FOR SPECIALISTS MADE TO CUSTOMERS OWN REQUIREMENTS

CLASSIFIED ADVERTISEMENTS

2d. *a word, minimum* **4/-.** *Box Numbers* **1/-** *extra.*

Address Box No. replies to : N.A.G. PRESS, LTD., 226 Latymer Court, London, W.6.

TIME RECORDERS.—Sales—Rental Service. Tel. HOP. 2239. TIME RECORDER SUPPLY & MAINTENANCE CO. LTD., 157/159 Borough High Street, London, S.E. 1.

MR. M. DAVIDSON, F.S.M.C., qualified opthalmic optician, is in constant attendance, for sight-testing and dispensing of optical prescriptions, at the HATTON OPTICAL CO., 19 Hatton Garden, E.C.1. (Tel. HOL 8193).

DIAMOND TOOL MANUFACTURER, LOCATED IN AUSTRALIA, requires foreman. Applicants must have knowledge of diamond polishing and setting also working knowledge of powder metal matrices along with experience in all phases of diamond tool manufacture. Successful applicant will be responsible to manager of department. Excellent opportunity for energetic man; good salary and working conditions. BOX 2087.

DIAMOND POWDERS mesh and microns, purity 98/99% available. Also diamond splinters. Inquiries: **AFRIKA DIAMANT BOART, 24 VESTINGSTRAAT, ANTWERP, BELGIUM.**

MANUFACTURERS of complete range of diamond tools and abrasives require well introduced agents in all countries. Please reply in confidence to BOX 2088.

DIAMOND TOOL and Wheel Specialists wish to contact partner with outlets for our products on a partnership basis. Give business resume to BOX 2089.

LONDON MANUFACTURERS of Small Tools, Jigs and Fixtures, etc., offer progressive and permanent positions of Sales Representatives to energetic and ambitious young men, 20-22 years of age, residing in Coventry, Bristol, Leicester, South Wales, Central Yorkshire, Manchester. BOX 2090.

THE DIAMOND NEWS

and

S.A. WATCHMAKER & JEWELLER

(Official organ of S.A. Jewellers Association, Ltd.)

The Voice of the Diamond Industry

- The only magazine of its kind on the African Continent ; circulates throughout the World, including Russia.
- Many of our supporters are your front-line ambassadors on whose goodwill and co-operation much depend ; reach these potential buyers and sellers through this medium.
- A monthly magazine containing approximately 72 pages of text matter, suitably illustrated.

Subscription Rates, per annum 21/- (Post free)

For information on Rates and spaces available, write :—

Advertising Manager,
P.O. Box 361,
KIMBERLEY,
South Africa.

ADVERTISERS' INDEX

	Page
B.O.A.C.	29
Diamant Boart	39
Diamond News, The	40
Drukker, D. & Zn. N.V.	24
Habit Diamond Tooling Ltd.	Cover III
Henderson Diamond Tool Company, Ltd., The	39
Impregnated Diamond Products Ltd. ...	Cover IV
Indusmond (Diamond Tools) Ltd	23
Industrial Diamond Co. (Sales) Ltd. ...	Cover II
Smit, J. K. & Sons (Diamond Tools) Ltd. ...	21
Triefus & Co. Ltd.	Cover I
Vaughan, Edgar & Co. Ltd.	31
Wolverhampton Diamond Die & Tool Co. Ltd.	23

o

● PUBLISHERS : N.A.G. PRESS, LIMITED 226 Latymer Court, Hammersmith, London W.6, England Telephone : RIVerside 2143

o

Contributions of scientific, technical and practical interests and news items are invited, but responsibility cannot be accepted for the safety of MSS, drawings, photographs or other matter submitted. Unaccepted matter will be returned.

o

Information of Rates and spaces available for Trade Advertisements will be forwarded on request. I.D.R. is published monthly on the 18th at 1/3 a copy. It is obtainable through Newsagents and Booksellers, or by Postal Subscription, 15s. a year post free, from the Publishers' address above.

Subscriptions in U.S.A $2.50 are received by the usual U.S.A. Subscription Agencies or direct from the Publishers, address as above.

INDUSTRIAL DIAMOND ABSTRACTS

Industrial Diamond Information Bureau,
2 Charterhouse Street, London, EC 1.
Telephone : FLEet Street 1577

1959 Volume 16
FEBRUARY

DIAMOND MINING AND INDUSTRY

Mining procedure and method at C.D.M.

S. W. Devlin. *Journ SA Inst Min & Metall* 1958 Vol 59 (4) pp 184-201 (Nov)

The methods of development sampling, overburden removal, and excavation of diamondiferous gravels are outlined and photographically illustrated, whilst the primary treatment of the gravels through field screening plants is dealt with in more detail. During and immediately subsequent to the Second World War, suitable machinery and material were almost unobtainable, and planned mechanisation and expansion on these fields were retarded until about 1947. The effect of improved methods and extensive mechanisation of production over the last decade is described, with brief references to previous practice, and the resultant improved efficiency and increased productivity is illustrated by means of graphs. 18 illustr.

X *Ebe Hd|He*

Sierra Leone diamonds

Anon. *SA Mining & Engg Journ* 1958 Vol 69 Pt 2 (3432) p 1045 (Nov 21)

Steps are being taken to put diamond mining on a more stable basis in the Kono province of Sierra Leone, a centre of illicit operations.

W *Hd.3672*

News of the industry

J. K. Smit & Sons (Diamond Tools) Ltd, 22-24 Ely Place, Holborn Circus, London EC 1. *Machinery* (London) 1958 Vol 93 (2406) p 1495 (Dec 24)

The firm has a steady demand for diamond tools of different types, used in mining and precision engineering. The tools in which it specialises are those containing diamonds cut especially for individual purposes, such as grinding wheel truers, indenters for hardness testers, tools for turning metals and other substances, trepanning tools, and rock drill bits. The research establishment of the company investigates possible new applications of diamond.

A *Nd|Nf|Nhb|Nj*

Soldiers of the ' diamond front ' (' Secret of the Siberian platform ')

V. Osipov. *Mol gvard* 1958 (7) pp 236-237 (July); *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2529 (Nov) (Original in Russian)

X *Eb.332*

Diamond tool companies' addresses change

Anon. *Ind Diamond Rev* 1958 Vol 18 (215) p 198 (Oct)

Changes of address are given for the Universal Diamond Co Ltd, and Diagrit Diamond Tools Ltd.

W *.241*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND AND OTHER HARD MATERIALS

Atomic heat of diamond from 11° to 200° K

D. L. Burk, S. A. Friedberg. *Phys Rev* 1958 Vol 111 (5) pp 1275-1282 (Sep 1)

The atomic heat of 8.3 moles of clear diamond chips has been measured between 11 and 200 deg K in a vacuum calorimeter. The capsule made to contain the diamond was essentially an aluminium cup (4.5 mm wall) with an open well to receive the L and N capsule-type platinum resistance thermometer and an external electrical heater winding of No 38 Manganin wire. The improved accuracy at lowest temperatures resulted from the fact that the capsule correction was made a much smaller fraction of the total heat capacity in this work than in previous investigations. Comparison is made with the theoretical values of Marcus. The observations are consistent with the calculated variation and with a θ_D (0) = 2240 ± 50 deg K calculated from the elastic constants. Small discrepancies with the theory at the lowest temperatures are attributed to causes other than the vibrational heat capacity of the bulk lattice. 6 illustr, 25 ref, 1 table.

A *F Ud Vb*

CONTENTS

Diamond Mining and Industry	A21	Rock Drilling	A29
Physical, Chemical, and Mechanical Properties	A21	Wire Drawing	A29
Diamond, etc, in Instruments	A24	Grinding and Polishing of Hard Metals ...	A29
Hardness and Wear Testing	A24	New Machining Methods	A31
Truing of Grinding Wheels	A25	Surface Finish Testing	A32
Fine Boring and Fine Turning of Metals ...	A27	Miscellaneous	A32
Cutting and Machining of Glass	A27	Book Review	A32
Machining of Stone, etc	A28	Trade Literature	A32
Gem Polishing	A28	Patent Lists	A34

ASME production topics : Diamond tools, press safety, compression forming

Anon. *Am Machinist* 1958 Vol 102 (26) pp 93-94 (Dec 15)

Papers to the 1958 ASME meeting included one by C. L. Fanning on synthetic *v* natural diamonds. The brittleness of synthetics, which is an advantage for certain applications, becomes a liability when high feed rates and high unit pressures are encountered, *eg* in cut-off wheels. A second limitation is size : mesh sizes 60 to 600 have been produced, but the majority is above 80 mesh. The range 20 to 80 mesh is not covered by synthetics.

Mr. G. J. Goepfert discussed his studies of the chemical reaction between abrasive and work and the adhesion of wheel material and work material in the grinding process.

W *Chc Rd:Qm/Fc*Fh*

The friction of solids at very high speeds. I. Metal on metal. II. Metal on diamond

F. P. Bowden, E. H. Freitag. *Roy Soc Proc A* 1958 Vol 248 (1254) pp 350-367 (Nov 25)

The friction of various types of metals is observed.

The friction of diamond on itself in air is low, but in a good vacuum it rises to a higher value, although this is dependent on the crystallographic direction in which the abrasion takes place. The direction of easy-abrasion corresponds to high friction and the 'hard' direction to low friction. The probable reason for this fact is that high temperature is more easily reached when abrasion is in the direction of high friction.

It is shown that diamond can, however, be abraded or polished even by comparatively soft metals, at appropriate speeds. There is evidence that such polishing and abrasion is due largely to a high temperature phase change of the diamond into another form of carbon.

For the experiments, three diamonds were attached to strips of brass by Araldite, and mounted in such a way that they could touch a spinning ball with their octahedral faces lying parallel to the vertical axis of rotation. The loads used varied from 15 to 50 g, and the deceleration of the metal sphere ($\frac{1}{2}$ in. diameter) lasted from 10 to 30 sec, depending on the coefficient of friction and the initial speed of the ball. Four different types of ball were used. The metal and diamonds were degreased in boiling benzene, although their state of cleanliness proved to be unimportant.

Metals with a high melting point were most effective for abrading diamond, and it was concluded that the wear of diamond is due to an allotropic transformation into graphite or amorphous carbon under the influence of localized friction heating. 27 illustr, 16 ref.

A *Bf Ung/F Ung*

The fluorescence of diamonds excited by x-rays

I. G. Matthews. *Phys Soc Proc A & B* 1958 Vol 72 (468) pp 1074-1080 (Dec)

Types I & II diamonds, some irradiated and others not, were submitted to examination with x-rays for fluorescence, and the spectra of each were recorded photographically. The spectra so obtained were broadly similar for all specimens, but minor differences are described. The spectrum shown by the majority of specimens consisted of two broad bands whose positions were similar to the positions of the 4150 AU and 5032 AU systems found under ultra-violet excitation. The x-ray excited fluorescence involves, apparently, the same centres as those which give the ultra-violet excited fluorescence. The emission was obtained even when ultra-violet excited emission was very weak. Possible explanations are discussed. 3 illustr, 7 ref, 2 tables.

A *F Hx Ukp*

Hardness of neutron-irradiated diamonds

A. C. Damask. *Journ Appl Phys* 1958 Vol 29 (11) pp 1590-1593 (Nov)

To study the amount of wear of unirradiated and neutron irradiated diamonds in comparison, South American boarts, already shaped with circular cone tips as gramophone styli, were ground for a standard period of time on silicon carbide wheels. The diamond was turned eight times during grinding to ensure random orientation of the axis. The volume of diamond removed was calculated and photographs compared and superimposed.

It was found that the amount of wear increased with increasing irradiation, *ie* that the diamonds became softer with increasing irradiation. The decrease of cohesive energy of an irradiated diamond was estimated from the number of broken bonds and the strain energy of the density change. The experiments indicated that dislocation motion is not responsible for the wearing of diamonds. 3 illustr, 18 ref.

A *F Qvc Unr*F Unr*

Calculations on the shape and extent of space charge regions in semiconductor surfaces

G. C. Dousmanis, R. C. Duncan jun. *Journ Appl Phys* 1958 Vol 29 (12) pp 1627-1629 (Dec)

The shape and extent of space charge regions in semiconductor surfaces are briefly discussed. Curves describing the potential as a function of distance inside the semiconductor are obtained by numerical integration of the Poisson equation. The curves apply to all semiconductors. They show the effects of different resistivities and the increased depth of the space charge regions expected in pure III-IV compounds over those encountered in Ge and Si. 3 illustr, 3 ref, 2 tables.

A *Bde Ue*

Etch pits and trigons on diamond. I, II

F. C. Frank, K. E. Puttick, E. M. Wilks. *Phil Mag* 1958 Vol 3 (35) pp 1262-1279 (Nov)

On the faces of a type I diamond octahedron of particularly good quality there have been observed clusters of trigons which appear to be associated with a centre of strain in the interior of the stone. The trigon patterns show features which can only have been the result of surface dissolution. These observations are discussed, and it is concluded that most trigons are etchpits ; there is evidence that these particular trigons are centred on dislocations.

Possible explanations are considered for the fact that the usual laboratory etchants develop pits oppositely oriented to trigons.

A further survey was carried out in order to study the slopes of the faces of pyramidal trigons on three diamonds. It appeared that the trigons fell into two groups, deep and shallow, differing in the slope of their pyramidal faces by a factor of 5 to 7, despite considerable variation within groups and wider variation from stone to stone. Other stones occur for which no such clear resolution is possible.

In part two, some experiments on artificial etching of diamonds are described. Etching in steam and chlorine at temperatures of around 800 deg C produces etch pits in 'positive' orientation (*ie* opposed to that of natural trigons). Wet hydrogen in the same temperature range and above gives inconclusive results. Etching in this medium may be greatly accelerated by the presence of a catalyst.

Diamonds heated in fused kimberlite at about 1450 deg C develop sharp-edged triangular pits in 'negative' trigon orientation. The bearing of this observation on the natural history of diamond is discussed. 16 illustr, 9 ref, 2 tables.

A *F Ql Ubm*

The diffraction of x-rays by diamond. III

C. V. Raman. *Indian Acad Sci Proc A* 1958 Vol 48 (1) pp 1-8 (July)

Memoir No 109 of the Raman Research Institute, Bangalore 6.

Three colourless, high quality diamonds were used in the investigations: the first a cleavage plate parallel to the (111) spacings of the crystal, the second a flat tabular crystal with its natural form as a hexagonal plate with faces parallel to the (111) planes, and the third a thin faceted plate of diamond with its faces nearly parallel to the (111) planes. The first two differed enormously in their physical behaviours from the third. From photographs taken with λ 2537 radiation, and with crossed polaroids, it is seen that the cleavage plate and the tubular crystal are both perfectly opaque to the λ 2537 radiation of the mercury arc, and that they exhibit no trace of biretringence, *ie* they are perfect isotropic crystals. The thin faceted plate is, on the other hand, completely transparent to the λ 2537 radiations of the mercury arc, but it exhibits a feeble but easily seen birefringence pattern with definite geometric features related in orientation to the structure of the crystal. Further tests by single-crystal and double-crystal x-ray spectroscopic methods demonstrated that the non-birefringent diamonds which are infra-red active and possess only tetrahedral symmetry in their electronic configuration are extraordinarily perfect and are ideal diamonds. These are the diamonds that exhibit the phenomena of dynamic reflection of x-rays. The detailed studies of the phenomena show that the experimental facts of the subject are completely in agreement with the results of the theory propounded in the first two parts of the memoir. The non-appearance of the dynamic x-ray reflections with the diamonds which have an octahedral symmetry of electronic configuration is shown to be consequential on these diamonds being inactive in the absorption of infra-red radiation. 15 illustr.

A *F Uklb*

Index of refraction of neutron irradiated diamond

J. Pelsmakers, J. Schepers. *Physica* 1958 Vol 25 (10) p 838 (Oct)

Letter to the editor.

Large changes in the density of neutron irradiated diamond have been reported by Primak, Fuchs, and Day, so measurable changes in the index of refraction could be expected for irradiated diamond, even at much lower doses. In experiments, a diamond prism of about 200 mg and with an angle of about 43° was used, and the index was measured for different neutron doses up to 1, 2.10^{17} n/sq cm. No changes of index were detected. 1 ref.

A *F Qvc Ukhb*

Optical properties of diamond type crystals

V. A. Mashkevich. *Fiz sbor* 1957 (3) pp 132-135; *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2393 (Nov) (Original in Russian)

X *Bd Uk*

Optical methods for the ultrasonic determination of the elastic constants of sapphire

W. G. Mayer, E. A. Hiedeman. *Acoust Soc Am Journ* 1958 Vol 30 (8) pp 756-760 (Aug)

Three optical methods, formerly used only for isotropic media, are applied to find the ultrasonic velocities in sapphire. From the results, the elastic constants are calculated for this crystal. The elastic moduli are determined from measurements of ultrasonic velocities in different crystallographic directions, and Young's modulus is plotted as a function of these directions. 4 illustr, 19 ref, 3 tables.

A *Bbd Uncb V*

The abrasion of diamond

M. Seal. *Roy Soc Proc A* 1958 Vol 248 (1254) pp 379-393 (Nov 25)

Diamond being the hardest substance known, with the possible exception of the recently discovered cubic modification of boron nitride, abrasion of it can only be carried out by diamond itself. The process is unusual owing to the large directional variation in resistance to abrasion of diamonds abraded with diamond powder. The wear rates for different crystallographic directions vary by a factor of 500 or more. An attempt has been made to determine whether the abrasion of diamond by diamond is primarily mechanical or thermal, *ie* whether it occurs by fragmentation of the diamond on a microscopic scale, or by burning or an allotropic change caused by the local high temperatures produced by friction.

The experimental work described is in two sections: track formation on diamond, and the friction of diamond. The work on track formation, carried out at low sliding speeds with a rounded diamond slider and a plane diamond surface was done in an attempt to reproduce on a macroscopic scale the damage occuring on a microscopic scale during abrasion. It was found that, according to conditions of sliding, tracks of 3 main types can be produced, and that on an individual diamond face there is no variation of the ease of track formation with sliding direction. This last result contrasts with the large directional variation in the ease of abrasion, and indicates that high sliding speeds introduce some effect which causes the anisotropy in abrasion resistance. A thermally activated chemical effect is thought to be the most likely cause of this difference in behaviour at high and low sliding speeds, and the following explanation of the anisotropy in high speed wear rate is suggested. The work on friction shows that there is a variation with sliding direction of the coefficient of friction between diamond and diamond. Directions in which the friction can be high are directions of easy abrasion. The local surface temperatures during abrasion will depend on the coefficient of friction and will be greater when the friction is high. These directions would thus be expected on a thermal theory to be those of easy abrasion. Furthermore, a small anisotropy in friction would account for a large anisotropy in abrasion resistance. 20 illustr, 2 tables, 45 ref.

A *F:Cw/F Ung*

The cleavage surfaces of type I and type II diamonds

E. M. Wilks. *Phil Mag* 1958 Vol 3 (34) pp 1074-1080 (Oct)

The cleavage surfaces of 75 type I and 75 type II diamonds have been examined, using microscopy and multiple-beam interferometry. The work confirms an earlier qualitative observation that the surface of a type II diamond exhibits a more regular cleavage pattern. There are, in general, more cleavage lines on type I diamonds, and also a greater number of so-called river systems. The result suggests that impurities within the lattice lead to a more broken substructure in the type I diamonds. It is also shown that birefringence and counting properties are not appreciably reflected in the cleavage patterns, and that very few type II diamonds show evidence of a laminated structure.

A *F Ubd Vj/F Ubd Vr*

NOTICE FOR LOAN SERVICE USERS

Users of the Industrial Diamond Information Bureau Loan Service are requested to give the following information when requesting literature:

(*i*) *IDA* page number;
(*ii*) author of article; and
(*iii*) the *full* reference shown at the top of the abstract.

It is *not* sufficient to quote the reference shown at the end of the abstract; *this is for internal use only.*

Hydrothermal process produces synthetic sapphires

R. A. Landix, A. A. Ballman (Bell Telephone Labs). *Franklin Inst Journ* 1958 Vol 266 (2) p 148 (Aug)

A new hydrothermal technique is announced to have been successful in the growth of large sapphires up to ½ in. square by ½ in. thick. The crystals produced are strain-free, which gives them an advantage over previously produced sapphires for optical purposes.

Aluminium oxide can be dissolved and recrystallised from aqueous solutions if the temperature and pressure are high enough. This is the basis for the new technique, in which pressures of 20 to 50,000 lb/sq in. and temperatures of about 395 deg C and higher are used. Rate of growth varies, but generally ranges from 0.0002 to 0.010 in./day.

If the nutrient solution is 'doped' with small amounts of chromate, synthetic ruby is formed. If aluminium hydroxide is added at suitable temperatures and pressure, it is all converted after a few days to tiny corundum crystals, instead of being deposited on the major seed crystal.

A *Bbdb Ctc/Bbeb Ctc*

An uncommon growth feature in diamond

A. Halperin. *Phil Mag* 1958 Vol 3 (34) pp 1057-1060 (Oct)

Uncommon growth features which extended as terraces from the edges of growth sheets on octahedral faces of a diamond are described. One of these features is extraordinarily flat, probably down to atomic dimensions over its whole area (about ½ × ½ mm). From the characteristics of this feature it is concluded that in the last stage of growth of the diamond, when trigons are formed on its surface, growth sheets become frozen and growth proceeds only to the fined edges. 4 illustr, 6 ref, 1 table.

A *F Vhf*

Finger-sized perfect silicon crystals

GEC Labs. *Franklin Inst Journ* 1958 Vol 266 (5) pp 425-426 (Nov)

Dislocations, which often weaken metals, have been completely eliminated from crystals of silicon larger than a man's finger. Dr W. C. Dash, who is responsible for the new crystal-growing technique, is making important progress in the field of growing very hard crystals. *A* *Bhc Ct*

DIAMOND, ETC, IN INSTRUMENTS

Ruby maser

Anon. *Franklin Inst Journ* 1958 Vol 266 (5) pp 423-424 (Nov)

Synthetic rubies have been put to work at the University of Michigan in a low temperature device—ruby maser—which can out-perform both electron tubes and transistors. The device promises great advances in all long distance communications. Synthetic ruby is at present the most satisfactory material with regard to maser action, but experiments are being conducted to find out other suitable substances. *A* *Bbeb Tz*

Diamonds in music

Anon. *Optima* 1958 Vol 8 (4) pp 188-189 (Dec)

A brief description of the manufacture of diamond styli for gramophone pick-ups. The life of a diamond stylus is about 2,000 hours. (See *Ind Diamond Rev* 1958 Vol 18 (216) pp 209-210, 212-213 (Nov)—abstr next col). 3 illustr. *W* *Fc Hl Kn*

Fabrication of sapphire and diamond styli for gramophone pick-ups

A. W. Ploegsma. *Philips Techn Rev* 1957/58 Vol 19 (11) pp 324-326 (May 31); *Ind Diamond Rev* 1958 Vol 18 (216) pp 209-210, 212-213 (Nov)

A short illustrated description of the production of the extremely small sapphire and diamond styli for modern pick-ups. The sapphire styli are 0.4 mm in diameter and 1 mm long; diamond styli are even smaller. Some of the difficulties peculiar to the working of such small objects are described. Among the operations dealt with are the coning, radiusing, and mounting of the styli. 6 illustr, 3 ref.

W *Bbd Ceq Tde/Fc Hp Kn*

Gaging head

George Scherr Co, 200-MM Lafayette St, New York 12, NY. *Mod Machine Shop* 1958 Vol 31 (7) p 182 (Dec)

The Super Compar-It gauging head is a 2½ × 3½ in. instrument with a measuring accuracy of ±0.00001 inch. The dial range is ±0.001 in., and is graduated in units of 0.00002 inch. The movement is jewelled throughout to reduce friction, and a sapphire-tipped contact point is used to minimize wear. 1 illustr.

W *Wbb*

HARDNESS AND WEAR TESTING

Surface re-orientation caused on metals by abrasion—its nature, origin and relation to friction and wear

V. D. Scott, H. Wilman. *Roy Soc Proc A* 1958 Vol 247 (1250) pp 352-368 (Sep 30)

The present electron-diffraction investigation of unidirectionally abraded beryllium and magnesium elucidates for the first time the characteristic nature and the origin of the fibre texture caused by abrasion, particularly its relation to the friction coefficient and the wear. The effects of a wide variety of conditions of load, speed, temperature, and abrasive particle size are determined.

The materials used were polycrystalline beryllium cylinders, 1 cm in diameter and 1.5 cm long, machined from hot-extruded ingot produced from French Flake beryllium, and magnesium specimens cut from spectroscopically pure magnesium rod. The machined polycrystalline and single-crystal surfaces were smoothed on emery paper down to 4/0 grade, and then the final mechanical surfacing was performed upon a rotating wheel using a diamond compound abrasive (mesh size 3 micron). The distorted layer was removed electrolytically. The magnesium surfaces were similarly smoothed on emery paper, but the distorted layer was removed by 5 to 10 sec etching in 10% sulphuric acid, before the abrasion experiments.

In the experiments, the test pieces were abraded in any direction desired, using propul alcohol as the lubricant, and emery papers grades 3 (particle diameter 150 micron), 1 F (40 micron), 0 (35 micron), 00 (15 micron), and 0000 (5 micron). Alumina powder and diamond paste (Hyprez, Engis, Ltd) were also used as finer abrasives.

The main fibre orientation observed was of the oblique type, which is clearly a compression texture. A very weak tendency of azimuthal preference round the compression axis was also observed in a few cases.

With increasing load (above 1 kg/cub cm, using 0000 emery paper) on beryllium, in addition to the main oblique texture, the surface regions showed an increasing proportion of metal having a [001] fibre orientation with its axis normal to the surface,

associated with the progressively greater amount of metal removed by shearing.

Similar oblique and normal [001] fibre textures are developed by abrasion on single crystal beryllium surfaces, showing clearly the extent of lattice fragmentation. The region of transition to the underlying undisturbed crystal lattice indicates by its form that the deformation process involves flexural rotational slip on (0001), *ie* rotational slip on (0001) with simultaneous flexure of the slip lamellae about an axis parallel to (0001) not limited to the usual ⟨210⟩ direction. 24 illustr, 1 table.

A *Bf Cw Ubm*

Scratch hardness. II. X-ray investigation of structural change

T. Sutoki, K. Nakajima. *Tohoku Univ Res Inst Sci Rep* 1958 Vol 10 (4) pp 269-275 (Aug)

An x-ray study of the structural change due to scratching, or indentation with Vickers diamond indenters, was carried out. Single crystals and polycrystals of aluminium and silver were the materials used. The spotty diffraction pattern on the diffuse ring was observed in the x-ray photographs taken of the scratch track of a severely cold-rolled metal, but not observed in the case of indentation. The spotty pattern of a scratch track just corresponded to the x-ray photograph taken of partially recrystallized metal. From the experiments it was seen that a reasonable interpretation was that the scratch hardness of a metal is related to the annealed state, which is contrary to Tammann's view. 12 illustr.

A *Bfbb Cvb Vjf/Bfg Cvb Vjf*

Portable hardness tester

Anon. *Machine Shop Mag* 1959 Vol 20 (1) p 59 (Dec)

The new Penetrascope performs diamond pyramid hardness tests in grooves of 2 in. width or more, and to a depth of 7 inches. Loads up to 30 kg can be applied. The tester, which can be clamped magnetically or by chains, can also perform tests on flat surfaces. The range of hardness covered is from 150 to 1,100 DPH using the 136° diamond pyramid; it can also be supplied with 1 and 2 mm steel balls. Measurement of the impression is made by means of an optical indicating micrometer with an accuracy of ±0.001 mm. 1 illustr.

W *Cvd Nde Wghc*

Understanding cutting tool wear

H. Conn (Scully-Jones & Co). *Machine & Tool Blue Book* 1958 Vol 53 (12) pp 83-91 (Dec)

Tool wear can be defined as the loss of metal by the cutting tool, and the types of loss can be classified as (*i*) gradual loss in the form of microscopic wear particles; (*ii*) ploughing action of hard particles in the workpiece; (*iii*) chipping action where macroscopic pieces come from the tool; and (*iv*) corrosion. The first three types of wear are discussed. 11 illustr, 6 ref.

W *Pd Unr*

Determination of scratch hardness

V. K. Grigorovich. *Zavodsk lab* 1958 Vol 24 (8) pp 1007-1012; *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2423 (Nov) (Original in Russian)

X *Cvb*

USP 2,844,957 (Feb 14, 1955) **L. Small, Service Diamond Tool**

Motorized hardness tester

The use of a motor for applying the loads at uniform rates may result in vibrations which constitute a source of error. Such errors are eliminated by effecting the load application when the motor is stopped. The hardness tester, Fig 1, is arranged in frame 1 with the test piece on support 2 under the indenter 3. Support 2 is raised by handles 5 until the testpiece contacts indenter 3 moving lever 25 upwards. This movement, the application of the minor load, is indicated on dial 26. The pointer is then reset to zero before application of the major load by cable 27 running over guide pulleys 28, 29, 30 to hand wheel 31. The major load is provided by a series of weights 8 on arm 7 pivotally mounted on pin 9. Roller 12 on bell crank lever 13 is

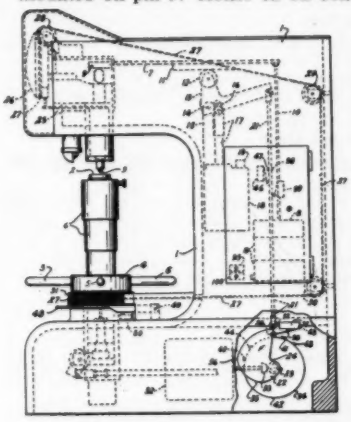


Fig 1. The motorized hardness tester shown here eliminates errors due to vibration by effecting the load application when the motor is stopped. USP 2,844,957.

shifted by moving rod 21 through cam 22, a uniform rate being produced by dashpot 18. Before the hardness reading is taken, the major load is removed by constant speed electric motor 32. A series of switches 37, 43, 46 is provided to keep the motor motionless during application of the major load. As the penetration rate is governed only by dashpot 18 a high speed motor can be used for removal, thus greatly shortening the sequence of operations. (11 claims, 2 illustr). Ref cited: 4 USP; ref USP 2,726,540.

J *Cvd Wghc*

USP 2,846,065 (Dec 15, 1954) **J. M. Alexander**

Hardness gauge

The apparatus is intended for electrically testing and continuously sorting metallic parts for hardness, and also for defects, *eg* inclusions and cracks, by electronic non-destructive means. Test pieces will be fed continuously from a chute dropping into a test coil where they are arrested by a stop fixed to a distributor chute. The test part is released by cams fixed to a rotating shaft controlled by the strength of a signal generated by the test part. The harder a part is, the less permeable it will be by electromagnetic lines of force, and, therefore, a lesser voltage will be induced in the secondary winding of the testing coil. (10 claims, 11 illustr). Ref cited: 7 USP.

J *Cvh*

TRUING OF GRINDING WHEELS

Copyrex copy-grinding machine. Kopierschleifmaschine Copyrex

Maschinenfabrik Blaesi AG, Solothurn, Switzerland. *Feingeraetetechnik* 1958 Vol 7 p 576 (Dec) (In German)

Details of the diamond truing operation are given. 3 illustr.

A *Cg Nj*

An accurate attachment for forming grinding wheel contours

Threadwell Tap and Die Co, Greenfield, Mass. *Ind Diamond Rev* 1958 Vol 18 (215) pp 195-196 (Oct)

The Tangi-Matic form truer is a micrometrically adjustable attachment for grinders. A diamond is used for the truing process. 2 illustr.

W *Ab Cg Nj Psf*

Indexing truing device

Universal Diamond Co Ltd. *Ind Diamond Rev* 1958 Vol 18 (215) pp 194-195 (Oct)

See *Ind Diamond Abstr* 1958 Vol 15 p A55 (Apr). 4 illustr. *W* *Ab Cg Nj Psf*

A four facet diamond truer

J. Walker. *Ind Diamond Rev* 1958 Vol 18 (215) pp 196-198 (Oct)

The adjustable truing diamond is fixed in a metal boss by means of a grub screw. The boss is brazed to the plane surface of a block which has a four facet base with a vertex angle of 150°. Each facet serves as a base for mounting the truer on the machine table under the wheel. Full constructional details are given. 1 illustr. *W* *Nj*

Formation of the profile shape of thread cutting tools. Ausbildung der Profilform von Gewindeschneidwerkzeugen

H. Weber. *Fertigungstechnik* 1958 Vol 8 (12) pp 545-550 (Dec) (In German)

The techniques of thread cutting, grinding, and rolling are described at length. Correction of the tool is economically possible for medium degrees of accuracy, if the design of the tool profile is in accordance with conditions mentioned, and when diamonds are used. Profiling of grinding wheels by means of truing rollers is not possible if any accuracy is required. 8 illustr, 11 ref. *A* *Chcp*

BP 806,629 **Fortuna-Werke Spezialmaschinenfabrik** (Nov 17, 1956—conv date, Germany) **AG**

Process and apparatus for dressing grindstones

Profile truing using template and tracer in the usual manner leads to certain difficulties in the adjustment of the diamonds and may also restrict the field of use. The new process operates with two tracers which become operative one after the other. Fig 2 is a

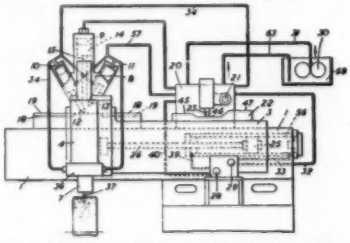


Fig 2. Diagrammatic front elevation of the two-tracer grindstone truing apparatus. BP 806,629.

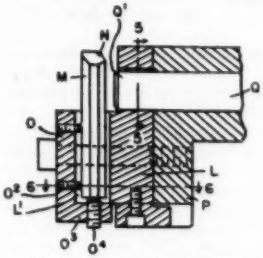
diagrammatic front elevation of the arrangement. The movement of diamond 37 on spindle 7 is controlled by tracer 12 in one direction, by tracer 13 in the opposite direction. Template 18 has a profile for the truing process from right to left, template 19 for the process from left to right. A control unit 20 provides the automatic hydraulic control for the various operations which include the turning of spindle 7 about 180° each time when changing from one tracer to the other tracer. The axes of the tracers are inclined to the plane of the grinding wheel, the preferred angle being 30°. (18 claims, 5 illustr).

J *Ab Cgf Nj Psf*

BP 807,064 **Gear Grinding Machine Co** (Oct 3, 1955—conv date, USA)

Exchangeable cutter units and mountings therefor, for use in trueing or shaping mechanisms for the grinding wheels of form grinding machines

The truing mechanism is mainly intended to work with two separate pantograph controlled units for shaping one side each of a grinding wheel with overlapping portions to be shaped by each of the two cutters. Each cutter consists of a polygonal bar M as shown in Figs 3 and 4. A diamond N is set in one end



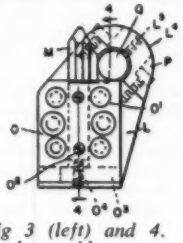


Fig 3 (left) and 4. Exchangeable cutter unit for use in truers for form grinders. BP 807,064.

of bar M. The bar is placed in V-shaped channel L^1 of block L closed by a cap O with a portion 03 at a right-angle to the main part of O. Block L is mounted on pantograph head P and secured by screws in position around shaft Q. Set screws can clamp bar M in block L. As the block will be mounted exactly on the pantograph the diamond will always be in the correct working position so that replacement of the unit on wear of the diamond can quickly be carried out. (3 claims, 7 illustr). Ref : BP 807,063.

J *Ab Cgf Nj Psf*

USP 2,845,921 (Jan 12, 1956) **J. Loecy jun**

Automatic device for dressing grinding wheels or the like

The device permits automatic operation during a predetermined cycle with automatic control of coolant supply, and automatic adjustment and turning of the diamond in order to increase its efficiency and prolong its life. An electrically controlled hydraulic system is included, and the hydraulic flow is varied according to the depth of cut and rate of travel desired. Fig 5 and

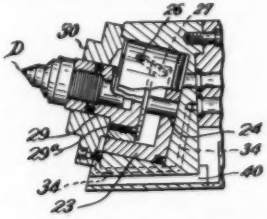


Fig 5 (left) and 6. The automatic grinding wheel truer showing the turning mechanism. USP 2,845,921.

6 show the diamond tool holder and its turning mechanism. The plunger 23 has an inwardly extending pin 26 engaging in the inclined slot 27 in ring 28 which surrounds and has one-way clutch connection 29a with the diamond tool holder 29. Hydraulic pressure moves the plunger 23 and the diamond holder into operating position, simultaneously turning the diamond, but on its return movement the plunger is not coupled with the diamond holder and the diamond is not turned back, so that the diamond always contacts the wheel with a new cutting point. (10 claims, 13 illustr). Ref cited : 3 USP ; see also USP 2,628,608 ; 2,770,984 ; 2,781,035.

J *Ab Cg Nj*

USP 2,845,922 (Apr 9, 1956) **A. T. Kohlstrunk, Wheel Trueing Tool Co**

Tool assembly

The device concerns a diamond truing tool which consists of few parts and which permits turning of the diamond by the simple application of a wrench in order to present new sharp edges to the wheel to be trued. Fig 7 is a cross section through the tool, Fig 8 shows

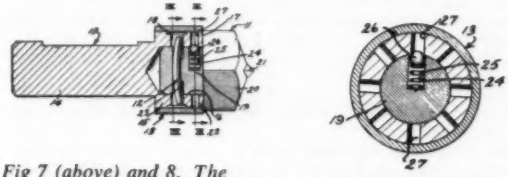


Fig 7 (above) and 8. The diamond truing tool and indexing assembly. Sharp edges of the diamond can easily be presented to the wheel. USP 2,845,922.

the indexing arrangement. Diamond 21 is set in the front part of diamond holder 11 which is designed as a hexagonal head for the wrench while the rear part 19 fits into the axial bore 16 of the enlarged head 15 of tool shaft 10 where it is securely held by the U-shaped spring 12 set in corresponding recesses 19 and 15. Head 10 is provided with radial holes 27 for indexing the diamond through spring biased ball 26. Ring 13 is pushed over head 15 to secure the assembly. (7 claims, 5 illustr). Ref cited : 3 USP ; 1 BP.

J *Ab Cg Nj*

USP 2,846,826 (Feb 26, 1957) **H. C. Miller, Super-Cut Inc**

Mounting and truing device for peripheral type circular grinding or cutting wheels

It is essential that a wheel is mounted correctly balanced and true, and this is particularly important for diamond wheels and saw blades where eccentric tolerances are extremely small. Fig 8, 9, and 10 show

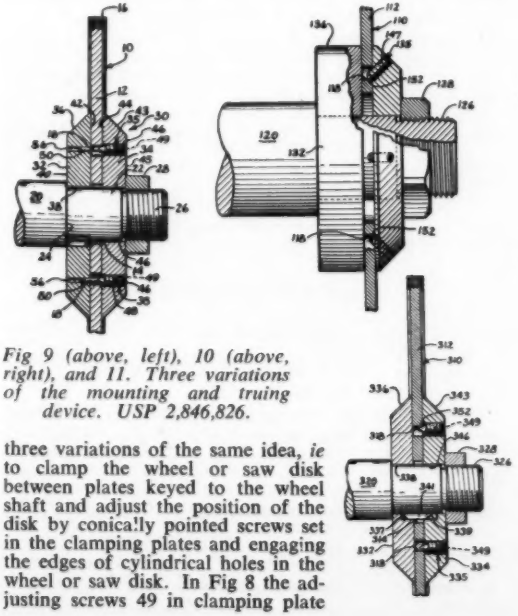


Fig 9 (above, left), 10 (above, right), and 11. Three variations of the mounting and truing device. USP 2,846,826.

three variations of the same idea, *ie* to clamp the wheel or saw disk between plates keyed to the wheel shaft and adjust the position of the disk by conically pointed screws set in the clamping plates and engaging the edges of cylindrical holes in the wheel or saw disk. In Fig 8 the adjusting screws 49 in clamping plate 34 are parallel to shaft 20 and provided with extensions 50 to fit into holes in the opposite clamping plate 32 which is keyed to shaft 20. In Fig 10 both clamping plates 332 and 334 are keyed to shaft 320, and the conically pointed screws 349 are designed without extensions. In Fig 9 the disk 112 is set against flange 136 of shaft 120, and the clamping plate carries inclined screws 135 to adjust the position of disk 112 with regard to shaft 120. (8 claims, 9 illustr). Ref cited : 2 USP.

J *Ab Cg Ab Cr*

FINE BORING AND FINE TURNING OF METALS

Copy-turning on a general-purpose type lathe

Anon. *Machine-Tool Rev* 1958 Vol 46 (276) pp 128-129 (Nov-Dec)

The Herbert-Smallpiece multi-cut production lathe, with suitable attachments, can turn form shafts of up to 29 in. in length. Heavy cutting with multi-tool set-ups and finish turning with diamond tools are possible. 4 illustr. *W* *Al Ceqb Pr*

Kennametal cutmeter

Kennametal Inc, Latrobe, Pa. *Machinery* (London) 1958 Vol 93 (2406) p 1488 (Dec 24)

The Cutmeter can be used for analysing the results of cutting tests or for determining the optimum cutting conditions for new work. Dials and switches on the face of the instrument provide for the setting of type of material, depth of cut, feed rate, and other factors. Charts are provided which indicate allowances to be made for unusual tool geometry and wear at the cutting edge. 1 illustr. *W* *Ceg Pr Wp*

Cemented [sintered] carbide tools—their application for increased productivity in heavy and general engineering

D. C. Rodgers (Hadfields Ltd). *Journ Inst Prod Engs* 1958 Vol 37 (12) pp 754-769 (Dec)

12 illustr, 7 ref, 1 table. *W* *Pdc*

Diamond machining and thread cutting on aluminium

K. Sterl. *Aluminium* 1957 Vol 33 (9) pp 613-615 (Sep) ; *Ind Diamond Rev* 1958 Vol 18 (216) pp 206-209 (Nov) (Original in German)

Advice is given on the machining of aluminium with diamond tools. Several types of tool are shown, and the selecting of suitable diamonds is briefly mentioned. 14 illustr, 1 ref. *W* *Bfg Ceq Nf*

Finishing aluminium valve bodies with diamond tools

J. Waller. *Ind Diamond Rev* 1958 Vol 18 (217) pp 235-237 (Dec)

A milling assembly, using eight diamond tools, provides a higher finish than conventional carbide tools. Full constructional details are given, including plans for the diamond tools required for the operation. 4 illustr. *W* *Cff Nr*

CUTTING AND MACHINING OF GLASS

Engraved glass church windows

Anon. *Ind Diamond Rev* 1958 Vol 18 (216) pp 213-214 (Nov)

The Rev V. Symons is using diamond burrs for the engraving of windows for the new church at Biggin Hill. 2 illustr. *W* *Bm Cp Ncb*

The polishing, surface flow and wear of diamond and glass

F. P. Bowden, H. G. Scott. *Roy Soc Proc A* 1958 Vol 248 (1254) pp 368-378 (Nov 25)

In an experimental study of the interaction between glass and diamond, when a diamond slider is rubbed on a glass surface, an octahedral diamond was rigidly mounted at the end of a pivoted arm. A dead load of from 250 g to 4 kg could be placed above it. The diamond was set in brazing alloy (melting point about 600 deg C) in a steel cup, and this cup was located by a spigot and secured by a grub screw at the end of the arm. The diamond and holder could easily be removed for microscopic examination and then replaced in the same orientation. The pivot and arm were mounted on a traverse so that the sliding radius could be varied. The glasses used were disks, 7 in. in diameter and $\frac{1}{4}$ in. thick, with a central hole for fastening. The disks were levelled by means of paper 'shims' until the upper surface was flat to within ± 0.0002 inch. A motor capable of any speed up to 5,000 rev/min was used.

It was found that the diamond sliding on glass could, under suitable conditions, induce surface flow of the glass. The speed (v) and load (w) necessary to cause this flow were studied, and it was revealed that flow only occurs if $v\sqrt{w}$ exceeds a critical value which depends on the type of glass. There was evidence that flow occurs when a critical surface temperature is reached, and approximate calculations indicated that this temperature corresponds to the softening point of the glass. It was suggested that this type of thermal softening and flow may occur on a submicroscopic scale when glass is polished.

Heavy wear of a diamond sliding on glass was observed. This wear is very dependent on the humidity of the atmosphere; in a dry atmosphere it may be 100 times greater than it is in a humid one. The wear rate on glass in dry air is greater than that on a scaife. The wear is accompanied by the production of a detritus of amorphous carbon so that the process appears to be primarily one of degradation of diamond to amorphous carbon. This degradation is aided by the temperature rise at the rubbing interface, and there is evidence that it can occur at temperatures lower than those required when the diamond is heated without rubbing. 7 illustr, 3 tables, 23 ref.

A *Bm Cw Nd*

The nature of polished glass surfaces

G. O. Rawstron (Taylor, Taylor & Hobson Ltd, Leicester). *Journ Soc Glass Technol* 1958 Vol 42 (209) pp 253T-260T (Dec)

Photographs, together with surface profiles, illustrating some recent experiments relating to the mechanism of polishing are discussed, and a modified version of the flow theory is considered.

The flow of a polished glass surface layer was demonstrated by traversing the specimen with a diamond-point under controlled pressure. A section across the grooves showed that the amount of glass raised by the diamond on both sides of the grooves corresponded, approximately, to the amount removed from the troughs. The diamond had not penetrated the disturbed surface skin and no glass was abraded. In a case where the diamond penetrated to the undisturbed surface material beneath the polished skin, the raised crests in the sectional view were considerably smaller than the troughs, thus showing that glass had been removed by the diamond. It appears probable, therefore, that glass removal or loss of weight during polishing is produced only by the abrasive particles which penetrate below the fluid skin and fracture the material beneath. 12 illustr, 12 ref.

W *Bm Chm Ubm*

A general purpose glass grinding machine

C. H. Wiltshire. *Lab Pract* 1958 Vol 7 (12) pp 700-703 (Dec)

The construction of the machine, which uses a 10 × 2 in. silicon carbide wheel, is described in detail. Applications and attachments are also described. 4 illustr. *W* *Bm Chc Pe Rgc:Pr*

MACHINING OF STONE, ETC

New masonry diamond blade

Clipper Diamond Mfg Co. *Ceram Age* 1958 Vol 72 (5) p 9 (Nov)

A new diamond blade for cutting highly abrasive masonry materials has been developed. The blade is of tungsten carbide, the outer portion being of conventional design with a usable diamond depth of $\frac{1}{8}$ inch. Below the diamond bearing region is a non-diamond bearing strip which helps to reduce undercutting and maintain segment width throughout the life of the blade. The blade is available in both 14 and 18 in. diameters. 1 illustr. *A* *Bn Ceg Nt*

Fused silica and fused quartz. I & II

J. A. Frost. *Lab Pract* 1958 Vol 7 (11) pp 644-645 (Nov); (12) pp 704-707 (Dec)

The first part briefly discusses the properties of fused silica and fused quartz. In the second part, some industrial applications are mentioned, and the cutting and joining of tubing is described. Large diameter tubing and rod can be cut with silicon carbide or diamond-impregnated saws. (To be cont). 4 illustr.

W *Ag Bcb Ceg Nt/Ag Bcb Ceg Pc/Bcb U*

Bandsaw blades have 2500 sfm cutting speeds

Sample Marshall Labs, 63 Park Ave, Lyndhurst, NJ. *Carbide Engg* 1958 Vol 10 (12) p 24 (Dec)

Diamond-impregnated bandsaw blades can be run dry for cutting-off on plastics, but should be used with a coolant on carbides, ceramics, and glass. The diamonds are held in an electro-formed nickel bond, and cutting speeds of 2,500 surface ft/min are necessary.

W *Bk Ceg Nt/Bl Ceg Nt/Bm Ceq Nt/Bp Ceg Nt*

GEM POLISHING

On the practice of polishing gems. Aus der Praxis des Edelsteinschleifens

E. Frey. *Dtsch Goldschmeide Ztg* 1958 Vol 56 (12) pp 726-728 (Dec) (In German)

In olden times, cutting and polishing the harder gemstones was long and tedious; this has been made much quicker and easier by the introduction of diamond saws. Cutting of rough stones may be done either with a circular saw, as in the case of most gems, or with a band saw, usually reserved for larger blocks such as marble, porphyry, et cetera. The circular saw may be a slurry saw, a hand-operated diamond saw, a manufacturing diamond saw, or a trimming saw. Instructions are provided for each. (To be cont). 8 illustr. *A* *Bb Ceg Nt*

ROCK DRILLING

Crude oil drilling method. Erdoelbohrverfahren

H. Runge. *Erdoel & Kohle* 1958 Vol 11 (11) pp 825-827 (Nov) (In German)

Lecture given in the 11th Mineral Oil Lecture Series of the Mineraloelwirtschaftsverbandes eV, Hamburg, March 17, 1955.

The development of drilling for oil from its beginnings, some 100 years ago, is described. At first drilling was performed by a tool beating against the rock, and without the flow of any form of coolant. In 1846, a method was introduced in which a water spray was used with a diamond-set drill crown. The drill performed by abrading the rock round a central core, the core being pushed up through the centre of the hollow crown. The heat produced by the friction of this method necessitates the use of a coolant. In diamond drilling, the coolant is pumped through a hollow bore rod to the base of the crown where it mingles with the abraded matter and comes up with this matter to the surface, thus solving the problem of the removal of boring dust at the same time as that of reducing the temperature.

The water coolant used in diamond drilling was later replaced by a thick coolant which was a more or less colloid solution of clay in water. The advantage of this is that the greater specific weight gives the column of coolant a considerable hydrostatic pressure, and this pressure causes strengthening of the bore hole wall. The colloid-water bond in the thick coolant lessens the amount of water given off to the rock, and the two advantages together result in such protection of the layers drilled through that these do not tend to cave in deep down, as can happen in dry boring.

Different arguments for and against dry and wet methods, rotary and percussion drilling, and turbine drills, are given. *A* *Cfh.28*

Diamond bits

Hoffman Bros Drilling Co. *Glass Ind* 1958 Vol 39 (9) p 491 (Sep)

A complete line of thin-wall diamond bits for use on such materials as glass, ceramics, and granite, is being produced. These precision tools are adaptable to production line or mobile operations.

A *Nhb*

Blasthole diamond drilling at Flin Flon

T. A. O'Hara. *Mining in Canada* 1957; *Ind Diamond Rev* 1958 Vol 18 (213) pp 153-158 (Aug); (214) pp 172-174 (Sep)

EX diamond bits have been used for all production drilling since 1949. Straight-wall coring and pilot-blast types are used. Core bits are used in hard quartz porphyry or in very soft chlorite schist. Pilot-blast bits are used chiefly in the solid sulphides which contain a high proportion of pyrite. High diamond loss prohibits the use of concave bits. Details are given of matrices, diamond sizes, and drilling procedures. 7 illustr, 4 tables. *W* *Cfb Plb*

Study on the drillability of diamond drill bit

K. Fujii. *Journ Min Inst Japan* 1958 Vol 74 p 359; *Insdoc List* 1958 Vol 5 (19) col 1501 (Oct 1)

X *Nhb Unx*

LITERATURE REQUESTS
When applying for the loan of literature abstracted in this journal, please quote the title of the article, the name of the author, and the number of the page on which it appeared.

USP 2,846,193 (Jan 7, 1957) **J. Chadderdon**

Milling cutter for use in oil wells

The cutter is to be used in particular for milling well casing or drill pipe or tubing by engaging the end thereof. Fig 12 shows an expansible cutter with the milling teeth in expanded position. Fig 13 is a cutter with fixed teeth, Fig 14 a tubular cutter with internal teeth which may fit over the drill string or fish in the well. The teeth are divided by

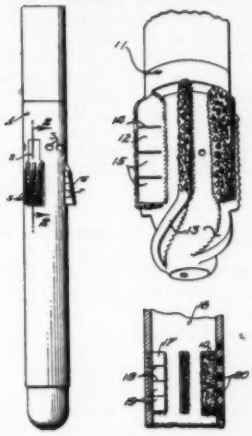


Fig 12 (far left), 13 (top, left), and 14. Details of the milling cutter for oilwells showing three variations. USP 2,846,193.

slots 7 (14; 18) into a number of segments 5 (15; 19) permitting the outer portion to break free as the teeth wear away. The teeth are formed of sintered carbide particles, bonded by *eg* cobalt, as the principal binder. As material mono-tungsten carbide is preferred and the sintered carbide should have a Rockwell A hardness of 85 and above. (8 claims, 8 illustr). Ref cited: 3 USP; 1 BP.

J *Az Cfj Pd*

WIRE DRAWING

Electrical diamond die drilling

Anon. *Wire Ind* 1958 Vol 25 (298) pp 963, 977 (Oct); *Ind Diamond Rev* 1958 Vol 18 (216) pp 214-216 (Nov); abstr *Ind Diamond Abstr* 1958 Vol 15 p A197 (Dec)

W *Fc Hqd Nkb*

GRINDING AND POLISHING OF HARD METALS

Diamoil, the lubricant for diamond-impregnated wheels. Diamoil, le lubrifiant pour meules diamantées

Anon. *Machine Mod* 1958 Vol 52 (597) p 44 (Dec) (In French)

The disadvantage of diamond wheels is that they become clogged with grease and dust, and wear smooth The simple methods of truing are delicate and slow, but results are often disappointing as diamond grains may be lost. M Henri Bertrand has developed a coolant-lubricant, 'Diamoil', to solve these problems. One of its peculiar properties is that it mixes with the particles of tungsten carbide in the diamond wheel and washes them away. The time for completing an operation is reduced and the life of the wheels is extended. The best results are obtained if the wheel is first cleaned with paraffin, and then finished with Diamoil. Even in very high speed optical grinding, the heat is negligible. A filter mechanism ensures the recovery of the oil. 1 illustr.

A *Nv Qr Sk*

After Mécanélec—Après Mécanélec

Anon. *Machine Mod* 1958 Vol 52 (597) pp 9-44 (Dec) (In French)

A review is made of all the exhibits, from milling machines to ultrasonic drills, in the Mécanélec exhibition. Amongst them are grinding machines made by Société Schmeder. The universal Schmeder grinder is equipped with a sensitive table on roller bearings with four spindle speeds : 2,650, 3,500, 5,000, and 7,000 rev/minute. Many attachments are provided, including a tool for truing diamond grinding wheels. On the Stokvis stand was the 'Royal' machine for sharpening sintered carbide tools with a diamond wheel, and a machine made by Maegerlé ; it has a special diamond attachment for profiling wheels to true the slides of lathes. 70 illustr. *A* *Pr.27.3215*

Semi-automatic grinding of metallographic specimens of very hard materials

Z. Ministr. *Hutnické Listy* 1956 Vol 11 (3) pp 154-160 ; *Ind Diamond Rev* 1958 Vol 18 (214) pp 166-170 (Sep) ; (215) 190-194 (Oct) (Original in Czech)

Very hard materials, *ie* boron carbide and diamond, were used for polishing metallographic specimens. The grain size of the abrasive was graded very evenly in order to complete the polishing as quickly and as economically as possible. Boron carbide was dispersed in paraffin on a cast iron disk, and the diamond was used as a paste on paper covering the disk of a single-wheel metallographic polishing machine. Twelve plastics mounts, containing in all 48 specimens, were fixed in a special holder and the polishing completed in about 50 minutes. The surface obtained was quite smooth and absolutely plane. Semi-automatic polishing, as described in the article, is suitable for the preparation of a considerable number of specimens simultaneously, provided that their hardness is approximately equal. 12 illustr, 16 ref, 2 tables.
W *Bfa Chm Kng/Bfa Chm Rgb*

Tool grinding

F. Offen. *Tooling* 1959 Vol 13 (1) p 27 (Jan)

Increased tool costs, arising from more frequent re-grinding, may result in increased production at lower over-all costs. An important factor in grinding economics is the grindability of tool steels, one of the subjects discussed in a paper presented to the ASTE by Carl Soderland. Steels that contain vanadium carbides are so hard that it may prove to be economic to use resinoid- or vitrified-bonded diamond wheels to grind them. Alternatively, the present types of wheels may be used, with continuous automatic truing. In this method, a diamond oscillates at a fixed distance from the desired work dimension, and the wheel is continuously fed into the diamond at a very slow rate, just sufficient to keep the wheel sharp and clean and the work to the exact dimension.

To offset diamond wear, a continuously rotating diamond cone could be used. This method has been successfully applied in glass grinding, when under ordinary conditions the diamond would be damaged at one pass. Yet another method is to use a small rotating diamond wheel running in the same direction as the grinding wheel but at a greater speed.
A *Ab Cg Nj/Chc.145*

Surface grinding to correct thickness

Anon. *Machine Shop Mag* 1959 Vol 20 (1) p 44 (Jan)

A process is described which eliminates the necessity for making trial cuts and measuring the thickness for each magnetic chuck load when surface grinding. The method involves the use of a prepared sample of the workpiece. *W* *Chcm Pr Psh.134*

Demonstration of 'Lapmaster' lapping equipment

Anon. *Ind Diamond Rev* 1958 Vol 18 (217) pp 237-238 (Dec)

The Lapmaster lapping principle is described. A diamond abrasive is occasionally used for extremely hard materials, but normal operations require only aluminium oxide or silicon carbide. A special attachment for lapping crystal wafers uses three diamond-tipped legs for governing the amount of material to be removed. The Diavite-Microtester was shown at the Exhibition ; it employs a diamond stylus for surface finish testing from 0 to 300 micro-in. CLA. 1 illustr.
W *Chd Kmg/Chd Rgc/Chd Rj/Cx Nd*

Herbert face milling cutter lapping attachment

Anon. *Machine-Tool Rev* 1958 Vol 46 (276) pp 135-137 (Nov-Dec)

The Herbert universal face milling cutter lapping attachment permits cutting teeth to be lapped without removing cutter or workpiece from the machine. A Norton diamond wheel is employed. 5 illustr.
W *Alc Chd Nv Pr*

The Italian Machine Tool Exhibition

Anon. *Ind Diamond Rev* 1958 Vol 18 (215) pp 186-188 (Oct)

Mentioned in the Exhibition review are the Triscop grinder, which uses diamond-impregnated wheels for reconditioning diesel engine injectors, and several other grinders equipped with diamond truing tools. British and foreign diamond tools were shown. 4 illustr.
W *Ab Cg Nj/Chc Nv Pr*

Universal machine for grinding and polishing

I. S. Kolomiitsev. *Stanki i Instr* 1958 Vol 29 (10) p 36 (Original in Russian)

X *Chc Pr/Chm Pr*

New abrasives : new grinding techniques

K. McIndoe. *Australasian Eng* 1958 Vol 50 pp 107, 109-111, 113, 115-117, 119 (June 7)

The significance of the markings on grinding wheels is explained, and the uses and properties of aluminium oxide and silicon carbide wheels are described. Factors to be considered when choosing a diamond truer are the wheel size and grade of the abrasive. General advice on using a diamond truer is given, *eg* if grinding wet, true wet ; internal grinding wheels under 1 in. diameter should be trued with a natural diamond point. A set-up for overcoming truing chatter is described.
W *Ab Cg Nj/Pe Rgc/Pe Rj*

Investigating the economic efficiency of finish grinding

A. A. Matalin. *Vestnik mash* 1958 Vol 38 (7) pp 67-68 (July) ; *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2423 (Nov) (Original in Russian)

X *Chct.145*

How do steel dies compare with carbide dies ?

J. P. Schmidt (Harig Mfg Corp). *Carbide Engg* 1958 Vol 10 (12) pp 9-15 (Dec)

Sharpening equipment required when converting to carbide dies is given as one diamond grinding wheel of adequate size, and a simple diamond truing attachment. Diamond wheel wear will cost about $1/hr of use. 4 illustr, 5 charts.
W *Aj Bkc Chc Nv/Aj Cg Nj*

Abrasive grain behaviour in the grinding process

A. V. Troitskii. *Steklo i keram* 1958 Vol 15 (8) pp 22-25 (Aug) ; *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2423 (Nov) (Original in Russian)

X *Bm Chc*

Continuous cleaning of grinding coolants. Depurazione continua delle emulsioni refrigeranti per rettifica

G. Alvisi. *Macchine* 1958 Vol 13 (11) pp 1053-1057 (Nov) (In Italian)

5 illustr. *M* *Sjg:Qeb*

Machining blades for gas turbine units

BRD Co Ltd, Aldridge, Staffs. *Machinery* (London) 1958 Vol 93 (2405) pp 1392-1404 (Dec 17)

Typical operations on turbine rotor blades are described. Machine tools employed include an Ex-Cell-O grinder, a Matrix form grinder with crush truing or diamond truing, and a Diaform pantographic wheel forming attachment. 15 illustr.

W *Aq Chc Pr*

Diacraft Inc

Diacraft Inc, 26538 West Seven Mile Rd, Detroit, Mich. *Glass Ind* 1958 Vol 39 (9) p 492 (Sep)

A 28-page catalogues describes the company's new metal- and resinoid-bonded diamond grinding wheels, made in all sizes and shapes normally used for carbide grinding, as well as in shapes to order for special purposes. *A* *Nv Urb.57/Nv Urc.57*

Diamond hones in Australia

Diamond & Boart Products (Australia) Pty Ltd. *Ind Diamond Rev* 1958 Vol 18 (217) p 238 (Dec)

Roughing hones in use with the International Harvester Co, Geelong, use 85 mesh diamond to remove 0.004 to 0.005 in. of material in 20 to 25 strokes. They are used with refrigerated Solvent F lubricant. *W* *Chh Nqe Qr Sk*

Standardized high-duty cylindrical grinding machines

M. Valli. *Stanki i Instr* 1958 Vol 29 (8) pp 9-12 (Aug); *Library of Congress Mthly Index Russ Access* 1958 Vol 11 (8) p 2423 (Nov) (Original in Russian)

X *Chc Pr*

USP 2,844,137 A. Rickenmann, Reishauer Werkzeuge (June 11, 1956—conv date, Switzerland) **AG**

Mechanism for generating the helical thread on grinding worms for gear grinding machines

The accuracy of the pitch of the grinding worm hitherto depended on the accuracy of the mechanism, *ie* accurate lead screws, lead screw nuts, and gears used in the production. Faults, however, are inevitable; they may add up during one working phase and compensate each other out during another phase, thus leading to errors of different magnitude. On the other hand, parts free from faults are extraordinarily expensive and hardly economical. The new mechanism requires no high accuracy. It is based on the idea of imparting to the lead screw nut a displacement for each revolution of the grinding worm which is a multiple of the pitch of the grinding worm to be generated. The longitudinal movement of the lead screw nut is transmitted to the carriage for the truing device by a lever system which reduces the movement at the ratio of the multiple. This means that the errors are also reduced by the same multiple. The truing device may be a single tool or it may comprise two tools, one for each flank of the worm, or it may be a crushing roller. The operation is controlled by hydraulic means. (2 claims, 8 illustr). Ref cited: 1 USP; 1 BP; 1 DBP.

J *Abmd Chcp Pr Ps*

USP 2,845,754 A. Rimoldini, Dalmine SpA (Jan 29, 1953—conv date, Italy)

Apparatus for shaping the tips of machine tools

Carbide tipped tools, *eg* threading tools, can be shaped with diamond grinding wheels. An optical projector and pantographic transmission, however, cannot overcome the inherent weakness of the method which lies in the inaccuracies of the manually controlled wheel motion, especially conspicuous where rectilinear profiles blend into curvilinear ones. Further, special skill is required and production limited. These disadvantages are avoided when using a die having at least one groove of the cross-section of the tip to be ground and grinding the tip by sliding along the groove or vice versa an abrasive *eg* diamond powder, in a suspension of a liquid (olive oil). Fig 15 shows one such

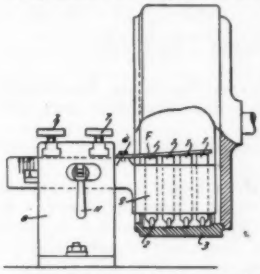


Fig 15. Apparatus for shaping the tips of machine tools. This assembly avoids the inaccuracies of manually controlled wheel motion. USP 2,845,754.

apparatus in which a number of tools 1 with tips 2 are held against grooves of the desired shape in rotating ring-shaped die 3. The tools may be inclined so as to produce a suitable rake angle. (14 claims, 8 illustr). Ref cited: 7 USP; 1 BP; *Machinery* 1930 (May).

J *Al Chc Kmg Pz*

NEW MACHINING METHODS

Electro-erosive machining of materials which are difficult to grind. Das Elysieren schwierig zu schleifender Werkstoffe

J. S. Spizig. *Werkstattstechnik & Maschinenbau* 1958 Vol 48 (12) pp 641-644 (Dec) (In German)

Electro-erosive processes are becoming increasingly popular in the USA. The process cannot be termed electrolytic or anode mechanical 'grinding', because the workpiece is not mechanically abraded but eroded by electro-chemical means. G. F. Keeleric was responsible for the first successful results in electro-erosion. As the results with erosive electrolytic machining were not satisfactory, metal wheels with a layer of diamond boart were developed. The diamond grains which protrude are non-conductors, and so preserve the separation between the anode and the cathode, which is bridged by the electrolyte. This process uses far less diamond than the traditional diamond grinding methods.

Various machines are recommended. 10 illustr, 10 ref, 2 tables. *A* *Ceqn*

USP 2,844,706 A. Lorenz, Engelhard Industries Inc (Aug 21, 1953—conv date, Germany)

Method of producing minute perforations in solid bodies by thermal impact exerted by concentrated corpuscular rays

When using the method of perforating solid bodies by concentrated corpuscular rays for producing synthetic fibre spinnerets in which a large number of minute perforations of equal diameter have to be made, it requires accurate timing of the duration of the action of the corpuscular ray. This is obtained by a switching device operated by the ray emerging from the perforation so that the ray itself then cuts off the

current which produces it. The preferred procedure is to provide beneath the workpiece an electrical absorber which becomes charged by the corpuscular ray and effects the switching-off by magnetic or electronic means when the charge reaches a certain value. The spinneret may be metal or (quartz) glass having many thousands of minute and uniform orifices closely grouped over a small area. (9 claims, 3 illustr). Ref cited : 8 USP. *J* *Bf Cfbm Pz*

SURFACE FINISH TESTING

Surface measuring at the machine using the Sigma Microtest surface finish comparator with new-type tracer head

Anon. *Machine-Tool Rev* 1958 Vol 46 (276) pp 144-145 (Nov-Dec)

The Sigma Microtest surface finish tester employs a diamond stylus, operating under a pressure of only 1 g, for testing between 0 and 200 micro-in. CLA in bores of down to ¼ in. diameter. The stylus has an hydraulic stroke of 1 in., and various dial settings can be made. Interchangeable skids give the instrument a wide testing range. 3 illustr. *W* *Cx Nd Wgf*

MISCELLANEOUS

The effects of the lubricant in 'running in' a machine. Die Wirkungsweise von Schmiermitteln beim 'Einlaufen' neuer Maschinen

A. Sonntag. *Schmiertechnik* 1958 Vol 5 (6) pp 267-273 (Nov-Dec) (In German)

During the early, critical, period of use of a new machine, surface damage is always likely to occur. Such damage may be in the form of smearing, erosion, ridge-formation, tears, scratches, and excessive abrasion. The article considers how the problem of abrasion and other forms of damage to the surface finish during the 'running-in' period can be controlled. The lubricant used primarily is molybdenum disulphide paste. 12 illustr, 3 ref. *A* *Pr Qr Sk*

The standard of simple machine tools. Ueber den Stand der Einfach-Werkzeugmaschine

H. Poetschke. *Werkstattstechnik & Maschinenbau* 1958 Vol 48 (12) pp 621-626 (Dec) (In German)

Lathes, milling machines, grinding machines, and presses are reviewed. 13 illustr.
A *Ceqb Pr/Cfj Pr/Chc Pr*

PUBLICATIONS RECEIVED

BOOK REVIEW

Werkstatt und Betrieb Calendar 1959. Werkstatt und Betrieb-Kalender 1959

Carl Hanser Verlag, Munich. 1959, 375 pp, illustr. Price : not known. (In German)

The calendar contains information of articles published in some 50 journals of different nationalities, under the following headings : materials and material testing, working methods, machine tools, instruments, tools, clamping tools, measuring and testing, workshop equipment and transport, workshop economy, construction, standardization and machine elements, as well as general technical information and lists of firms. This is the fifth year that the Werkstatt & Betrieb Calendar has been published, and it follows the usual pattern, with a diary in front, a full subject index at the end of the abstract section, two original articles, a list of information sources, and a detailed list of products and their manufacturers. The two original articles are one on photocopying newspaper articles, by Dr H. Kleine, and the other on the possibilities and limits of the application of nomography in the workshop by Dipl Math R. Schraeder.
A *Ceq.515*

TRADE LITERATURE

From wirecloth apertures as large as this . . . to more than ten times finer than this . . .

Endecotts (Filters) Ltd, Lombard Rd, London SW 19. Folder, 5½ × 8¼ in., illustr

Grids, grills, sieves, screens, strainers, and filters are illustrated. Wire gauze down to 400 mesh is available in brass, phosphor bronze, nickel, copper, and mild and stainless steel. Products are available in BS and US Standard sizes. *W* *Slg*

Pencil edging and arrissing or seaming wheels

Diamond & Boart Products (Australia) Pty Ltd, 14-16 Parramatta Rd, Stanmore, NSW, Australia. 1 p, 8¼ × 10¾ in., illustr

Diamond-impregnated pencil edging wheels are made for 5/32, 3/16, and ¼ in. glass. The arrissing wheels are made in two halves and can be adjusted by spacers to take glass from ¼ to 1 in. thick. The wheels run within a tolerance of 0.001 in., and over 3,000,000 in. of pencil edging can be performed with one wheel. It it estimated that the pencil edging wheels contain 7,000,000 diamond particles.
W *Nvd*

Acker—Bulletin 33-C

Acker Drill Co Inc, Scranton, Pa. 12 pp, 3¾ × 9 in., illustr

This bulletin presents brief summaries of information contained in the following catalogues : No 30—The Acker Teredo core drill, No 21—the Acker LD core drill, No 19—The Acker KR shot core drill, No 28—models RG and RGT power-operated and portable soil sampling rigs, No 40—AP all-purpose digger, No 26—soil sampling kit, and No 300—Lynac split tube sampler. Other items mentioned are Acker diamond drill bits and the Hillbilly core drill.
W *Cfb Plb.57*

Tasco

NV Diamond Tools Tasco, 52 de Vroente, Mariaburg-Antwerp, Belgium. 22 pp, 6¼ × 8¼ in., illustr. (In English, French, and Dutch)

The types of diamond grinding wheel manufactured by the company are described, and the designations used are explained. Brief notes on the uses of the wheels are given, and sectional diagrams show the geometry of the various types available. The company also manufactures diamond saws, diamond truing tools, diamond drills, and diamond powders.
W *N.57/Nv.57*

Diamond tools for industry

New York Diamond Tool Co Inc, East Orange, NJ. Loose leaves, 8¼ × 11 in., illustr

Presented in a handy loose-leaf binder, the information sheets cover single-stone wheel truing tools, diamond tools for internal grinding, thread grinding, and gear grinding, diamond cluster (multi-point) tools, shaped diamond tools, diamond tools for turning, boring, and milling, and diamond gauge points. Ten tips on the care and use of diamond tools are given, and a table serves as a guide to the selection of diamond sizes.

Information sheets published from time to time can be added to the catalogue. *W* *N.57*

Diamond wheels and hones, consumer net prices

Simonds Abrasive Co, Philadelphia, Pa. 20 pp, 8½ × 11 in., illustr

The items illustrated and described in the catalogue are available in both natural and synthetic diamonds, except in cases where a metal bond is used, in which case synthetic diamonds are unsuitable. Sectional diagrams and specifications are given for a wide range of diamond wheels and hones, and the Simonds diamond wheel marking chart is explained.
W *Nqe/Nv*

Neophot

Carl Zeiss, Jena, Germany. 5½ × 8½ in., 21 pp, illustr

Details are given of the Neophot universal instrument for use in metallography; it includes a microscope stand with objective stage, sub-stages, and camera. There is a combined vertical illuminator, and various measuring accessories, colour filters, and ground glass screens.

A microhardness tester, model D32, is also shown in the catalogue. It is suitable for measuring comparative hardness or making series investigations.
A *Cvdb Wghd/Vwl Wcm*

Diamax diamond wheels. Meules diamantées et outils base de diamant

Ets Jacques de Jong, 22 rue du Château, Bagnolet (Seine), France. 6 pp, 8½ × 10¾ in., illustr. (In French)

Diamax wheels can be had with metallic, resinoid, or semi-metallic bonds. Included in the catalogue are diamond-impregnated files, various attachments for cutting and grinding, and diamond powders. Truing diamonds are also shown. A separate sheet gives diagrams and specifications of the different tools.
A *Kmg/Nqc/Nv*

Peninsular snagging handbook for foundries, metal fabricators and steel mills

Peninsular Grinding Wheel Division—Abrasive and Metal Products Co, Detroit, Mich. 16 pp, 8½ × 11 in., illustr

The wheels covered in this catalogue are of silicon carbide and aluminium oxide in resinoid, vitrified, and silicate bonds. Information on all aspects of wheel use is presented. *W* *Chc Pe.57*

Diamond tools

Wheel Trueing Tool Co of Canada Ltd, Windsor, Ontario. 15 pp, 8½ × 11 in., illustr

Single-point diamond tools for truing, boring, and radius forming are shown, as well as single- and multi-point diamond truing tools. Tool geometry is shown in some cases, and information useful to users of the tools is provided. A diamond tool price list is issued separately. *W* *Cfd Mf/N.252/Nj*

Servall diamond knife holder assembly / a milestone in ultra-microtomy

Ivan Sorvall Inc, Norwalk, Conn. 1 p, 8½ × 11 in., illustr

The Servall diamond knife is supplied ready for use with the Servall 'Porter-Blum' microtome. The length of the cutting edge is such that it can be moved laterally to provide a fresh cutting portion when one section has dulled. The built-in collection trough is black anodized to facilitate viewing of sections.
W *Nfn*

[Manufacturing programme]

Drahtziehwerkzeugfabrik Oranien Berkenhoff & Drebes AG, Herborn/Dillkreis, Germany. Leaflet, 8½ × 11¾ in. illustr

The firm has no catalogue of diamond drawing dies, but their manufacturing programme includes diamond drawing dies, diamond dust in eight grades, and grinding pastes with a diamond content for repolishing tungsten carbide dies *A* *Kmg/Nkb*

Collected catalogues [Eichleitner diamond tools]

K. Eichleitner, Spezialwerkzeugfabrik, Weiden, Bayern, Germany

The properties of diamond, methods of working with them, setting, handling, and choice of stones, are briefly described; an illustrated price list is provided.

An illustrated list of glaziers' diamond tools shows 39 different tools and has a separate price list with it.
A *FHN.57/Ncb*

IDR REPRINT SERVICE

The following reprint of an *Industrial Diamond Review* article is now available, price 1s., from *Industrial Diamond Review*, 226 Latymer Court, Hammersmith, London W 6, or from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1:

I 250—Semi-automatic grinding of metallographic specimens of very hard materials, by Z. Ministr.

The following reprints, included in the September 1958 issue of the Reprint Service List, are now out of stock and unavailable:

D 8 —Economic use of diamond abrasive wheels, and

D 16—Diamond through the ages, by P. Grodzinski and W. Curtis.

Copies of the Reprint Service List are available, free of charge, from the Industrial Diamond Information Bureau.

PATENT LISTS

BRITISH

The British Journal (Patents) 1958 (3642) (Dec 3)

808,250 MICHIGAN TOOL CO. Method and apparatus for grinding worm elements.

The Official Journal (Patents) 1958 (3643) (Dec 10)

808,557 ARMSTRONG SIDDELEY MOTORS LTD. Machine for polishing, or lightly grinding, elongated workpieces.

808,314 JONES & SHIPMAN LTD, A. A., and HOULDSWORTH, J. Grinding machines.

808,329 TAYLOR (HOLDINGS) LTD, J. & H. Edge grinding machine.

808,473 HOFMANN, E. F. Means for gauging a workpiece which is being ground on a surface grinding machine.

The Official Journal (Patents) 1958 (3644) (Dec 17)

808,755 UNION CARBIDE CORP, formerly UNION CARBIDE & CARBON CORP. Synthetic resins and abrasive articles formed therefrom.

808,823 SZERSZAMGEPFEJLESZTO INTEZET. Adjustable feeding device for machine tools.

The Official Journal (Patents) 1958 (3645) (Dec 23)

809,191 REDFARN, C. A. Manufacture of abrasive articles.

809,004 SANDVIKENS JERNVERKS AB. Rock drill cutting insert.

809,028 GLACERIES DE LA SAMBRE SA. Method and apparatus for grinding and polishing glass.

809,288 GESELLSCHAFT DER LUDW VON ROLLSCHEN EISENWERKE AG. Devices for grinding substantially flat workpieces, for example, the slideways or [sic] machine tools.

809,188 LIDKOEPINGS MEKANISKA VERKSTADS AB. Centreless grinding machines.

UNITED STATES

Official Gazette 1958 Vol 736 (1-4) (Nov)

2,858,649 O. SCHEUBECK. Radius-grinding apparatus.

2,858,650 R. JANOWITZ, CONCRETE SAW CO. Pavement cutter.

2,858,652 J. J. LUTHMANN, R. N. RONEY, SHEFFIELD CORP. Machine tool device.

2,858,696 R. A. UNDERWOOD, GENERAL MOTORS CORP. Hardness testing apparatus.

2,859,565 G. JAVAUX, PILKINGTON BROTHERS LTD. Apparatus for grinding flat glass on both faces simultaneously.

2,859,666 G. H. DE LISLE. Power drive for reciprocating abrading tools.

2,860,451 T. M. DEAKIN, DEAKIN GEARS LTD. Gear generating machines.

2,860,453 K. FREY, GEBR BOEHRINGER GmbH. Apparatus for chamfering the teeth of gears.

2,860,458 A. RASKE. Abrading or grinding wheel.

2,860,459 W. J. PRESMYK. Tool grinding mechanism.

2,860,622 G. A. HIDER, GLEASON WORKS. Grinding machine having rotatable wheel dressing tool.

2,860,623 W. MUENCH, WALTER MUENCH INC. Long cutting edge diamond tool for dressing grinding wheels.

2,860,862 W. B. HORTON, H. E. FLETCHER CO. Methods and apparatus for wire sawing.

2,860,863 A. O. BRUESTLE, C. B. KREKELER, CINCINNATI MINE MACHINERY CO. Mining cutter bit having a resilient tongue.

2,860,960 J. R. GREGOR, ABRASIVE & METAL PRODUCTS CO. Abrasive articles and method for making the same.

2,860,961 J. R. GREGOR, S. S. KISTLER, ABRASIVE & METAL PRODUCTS CO. Method for making abrasive articles.

2,860,999 H. F. G. UELTZ, N. N. AULT, NORTON CO. Silicon carbide refractories.

2,861,166 W. W. CARGILL jun. Method and apparatus for hot machining.

2,861,400 R. G. ELLIS, MICROMATIC HONE CORP. Machine for grinding parallel surfaces.

2,861,561 J. OLSON, NORTON CO. Grinding machine truing apparatus.

AUSTRALIAN

Official Journal 1958 Vol 28 (38-43) (Oct-Nov)

217,323 CARL ZEISS FOUNDATION (CARL ZEISS). Drilling and cutting by a beam of charged particles.

217,445 FORD MOTOR OF CANADA LTD. Process for manufacturing cermets.

SWISS

Patentliste 1958 (20) (Oct)

333,432 A. RICHTER, H. WEBER, W. WOLF. Method of making tools for chip producing or chipless working, and tool made according to this method.

333,544 F. R. HARDI, NV PHILIPS' GLOEILAMPENFABRIEKEN. Method for engraving a plate, device for carrying out this method, and plate made according to this method.

333,560 R. KOCHERHANS, H. HEDIGE. Apparatus for measuring surface roughness.

333,614 A. MOTTU, S. SENGLET, SOCIETE GENEVOISE D'INSTRUMENTS DE PHYSIQUE. Precision machine tool.

333,624 GESELLSCHAFT DER LUDWIG VON ROLL'SCHEN EISENWERKE AG. Grinding machine, in particular for grinding slide ways.

333,625 W. OSENBERG, BISTERFELD & STOLTING Method of producing abrasive bodies bonded with synthetic materials.

FRENCH

Bulletin Officiel 1958 Vol 75 (3889-91) (Nov-Dec)

1,172,155 GENERAL ELECTRIC CO. Mount for cutting tools.

1,172,194 CLIPPER MANUFACTURING CO. Machine for sawing stones.

1,172,213 DIAMETAL AG. Machine for profile grinding .

1,172,600 S. BRISKMAN. Tool for grinding profiled teeth, and scissors thus obtained.

1,173,190 A. F. L. CERENE. Hot and cold machining of metals using tools with interior cooling, and its applications.

1,173,345 E. PEINETTI, SOCIETA ABRASIVI INDUSTRIALI TORINO. Reinforced grinding wheel or abrasive disk and method of its manufacture.

GERMAN

Patentblatt 1958 Vol 78 (48-51) (Nov-Dec)

Applications Open to Public Inspection

1,045,118 H. SOEDING, DEUTSCHE GRAMMOPHON GmbH. Grooved sound carrier, in particular disk record and device for recording and reproducing.

1,045,204 M. A. MUELLER, GOETZEWERKE FRIEDRICH GOETZE A-G. Device for the chip producing machining of hollow bodies.

1,045,203 E. WILDHABER, GLEASON WORKS. Method for the chip producing machining of helically shaped faces on the teeth of a clutch coupling or the like.

1,045,277 F. BURKON. Abrasive jet means composed of bonded material not containing quartz.

1,045,307 FA ADOLF VATES. Stone saw cable.

1,045,379 L. A. CONANT, C. F. HITTLE, UNION CORP. Method of making boron nitride.

1,045,437 M. KOEHLER, H. SPODIG. Metal ceramic wear resistant sintered body.

1,045,608 MOTOHARN KURATA, SUNAO SHIBATA, ASAHI GARASU KABUSHIKI KAISHA. Automatic glass cutting and breaking device.

1,045,767 E. WILDHABER, MAAG-ZAHNRAEDER UND MASCHINEN AG. Truing device for the grinding wheel of a gear grinding machine.

1,045,842 H. KRUG, DISKUS WERKE FRANKFURT a MAIN AG. Method and device for cementing fixing nuts in recesses of abrasive bodies.

1,046,341 W. BOESENBERG, H. EBNER, STANDARD ELECTRIK LORENZ AG. Method for producing monocrystalline shaped bodies of semiconductive material.

1,046,345 H. HEDIGER. Device for measuring surface roughness.

1,046,593 R. C. OSTHOFF, GENERAL ELECTRIC CO. Method for removing foreign metals in the purification of technical tungsten carbide.

1,047,052 BARNES DRILL CO. Measuring and controlling device for honing machines.

1,047,053 W. WROBBEL, METABOWERK CLOSS RAUCH & SCHNIZLER KG. Device for machining in stages the surfaces of workpieces on a series of grinding devices.

1,047,054 F. FRANKENHAUSER, H. P. FELDER, DEUTSCHE CARBORUNDUM-WERKE GmbH. Exchangeable abrasive segment for face grinding wheels.

Patents Granted

971,204 F. DORFNER, J. DORFNER. Metal bonded grinding body.

971,258 G. MUELLER, STAATL PORZELLAN-MANUFAKTUR BERLIN. Non-porous fired ceramic bodies of high surface hardness and smoothness for making thread guides.

AUSTRIAN

Patentblatt 1958 Vol 55 (10-12) (Oct-Dec)

200,089 W. A. KAMMERER. Boring head for deep drilling with expansible cutting edges.

200,107 PECHINEY CIE DE PRODUITS CHIMIQUES & ELECTROMETALLURGIQUES. Method for making aluminium oxide.

200,468 H. G. LUX. Grinding wheel permitting view of work.

200,890 FIRTH STERLING INC. Device for machining an electrically conductive workpiece by a series of spark discharges.

200,980 ERNST WINTER & SOHN. Diamond saw blade, in particular for cutting stone or the like.

201,493 G. GRESSER. Device for measuring and setting the spacing of consecutive cuts on stone sawing machines.

INDUSTRIAL DIAMOND TRADE NAMES INDEX
1959 EDITION

The closing date for the receipt of entry forms for the Industrial Diamond Trade Names Index has been extended to March 31st, following a late demand for entry forms.

The Index is open to entries from all concerned with industrial diamonds, precision machining, hard materials, and related subjects, eg industrial diamond brokers, tool manufacturers, and technical journals. Entry forms can still be obtained from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1. No charge is made for entries in the Index.

GENERAL NOTES

The Industrial Diamond Information Bureau is included in the Diamond Research Organization of Industrial Distributors (Sales) Ltd (incorporated in the Union of South Africa), together with the Diamond Research Laboratory in Johannesburg.

Abstracts

The Bureau prepares abstracts of current scientific and technical literature, including patents, on industrial diamonds and associated subjects. These are published monthly in *Industrial Diamond Abstracts*, which is supplied free to those concerned with the use of diamonds for industrial purposes, and to specialist libraries. The publishers do not claim any copyright in respect of abstracts in this journal. No specific acknowledgement is made to other abstract journals, and no objection will be made to other abstract journals using the contents.

The list of journals (latest issue, September 1955) from which *Industrial Diamond Abstracts* is compiled will be supplied on request.

Library

The Bureau has a Reference Library which seeks to cover world literature on the application and production of diamond tools. It is kept up to date by a careful examination of new publications announced in abstract and technical journals, and covers, in addition to English, German, French and Russian books. The library specializes in technical and scientific pamphlets.

Patent Abstracts

Patent lists are prepared from official patent journals of the major industrial countries, and patent abstracts in general from the printed patent specifications. Printed copies of British patent specifications accepted may be obtained from the Patent Office, Southampton Buildings, London WC 2, at 3s each. Numbers given under British applications for patents are for reference in all correspondence up to acceptance of the complete specification.

The following abbreviations are used :—BP for British Patent, USP for United States Patent, DAS for German Patent Application, DBP for German Patent (GP for German Patents issued prior to 1950), FP for French Patent, Canad P for Canadian Patent, and RP for Russian Patent.

Supply of Literature †

1. **Loan Service :** much of the literature abstracted in this journal is available in its original form, and can be borrowed for a period of fourteen days (in Great Britain only).

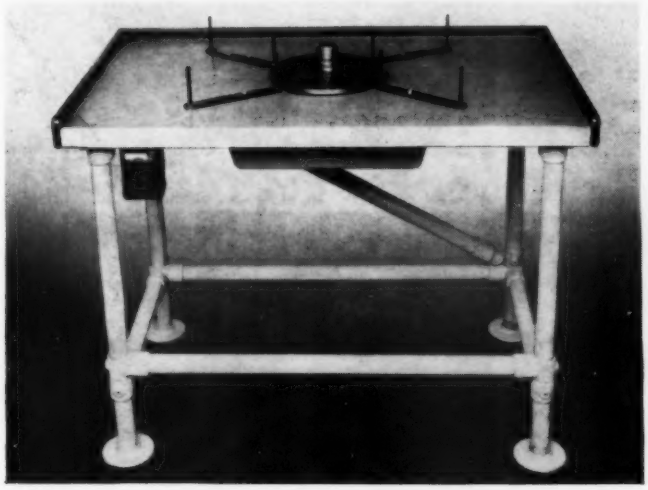
2. **Reprints :** copies of certain selected articles on industrial applications of diamond are available and can be supplied on request at a charge of 1s each, post free. New reprints are announced from time to time in this journal, and a classified list of reprints, dated September 1958, is available free on request.

Technical Information

The Bureau offers the resources of its considerable literature holdings to those seeking specific information on diamond tool and similar applications. Problems requiring fuller technical assistance can be referred to the Diamond Research Laboratory, Johannesburg.

Inquiries in connexion with these services should be made to Industrial Diamond Information Bureau, Industrial Distributors (Sales) Ltd, 2 Charterhouse Street, London EC 1.

'HABIT' DIAMOND POLISHING MILL



A New approach to an ancient skill

The Habit Table is of heavy, solid construction to absorb vibration from internal and external sources and provide an absolutely flat working surface which will not warp or twist. It is carried on a strong tubular framework with adjustable legs which make special foundations unnecessary. In fact, there are no installation costs—just plug in to the electric supply and work can commence immediately.

FEATURES OF THE HABIT POLISHING BENCH INCLUDE :

- Economy of floor space, due to built-in drive unit.
- Clear working area free of overhead obstruction.
- Supplied with the internationally famous De Winter Scaife.
- No balancing of scaife required.
- Scaife always parallel to table within .002″ (0.05 mm.)
- Trouble free bearings, fully sealed against entry of dust, require lubrication only twice yearly.
- Jointless long-life flat drive belt.
- Dead flat table top enabling mechanical dops and simple or complex fixtures to be employed.
- No corners or crevices to conceal dislodged diamonds.
- Adjustable feet to accommodate uneven floors.
- Easily dismantled for economical transport and shipping.
- No installation costs—just plug in.

DIMENSIONS AND SPECIFICATIONS

Table area:	28″ x 48″ (711 mm x 1219 mm.)
Height of table from floor:	36″ (914 mm.)
Floor space required:	28″ x 48″ (711 mm. x 1219 mm.)
Electric motor:	1 H.P. 3 phase A.C. 1 phase A.C. or D.C. as specified.
Switchgear:	Push button overload trip type and isolator.
Scaife speed:	2,500 r.p.m.
Standard equipment:	1 De Winter Scaife. 4 Tang retaining stops. 1 Spirit level. 1 scaife level gauge.

HABIT DIAMOND TOOLING CO. LTD., 294-6 Lillie Road, Fulham, London, S.W.6.

Telephone : FULHAM 7944.

'HABIT'

a journal for precision engineers and all users of industrial diamonds and other hard materials

INDUSTRIAL DIAMOND REVIEW

incorporating INDUSTRIAL DIAMOND ABSTRACTS

MONTHLY 1/3 SUBSCRIPTION 15/- A YEAR

February, 1959 Vol. 19 No. 219

a DEMONSTRATION?

IF YOU CUT, drill or grind glass, ceramics, carbide or any known hard material the Neven Mobile Unit will demonstrate most efficient production methods with diamond tools. May we send this Demonstration Unit to your works? The Sales Manager would be pleased to advise you when the Unit will be in your area.

IMPREGNATED DIAMOND PRODUCTS LTD OF GLOUCESTER

TELEPHONE 21164 (3 LINES) · TELEGRAMS IMPREG GLOUCESTER

IDP